FINAL REPORT TO THE U.S. DEPARTMENT OF DEFENSE

On the

DEFENSE REINVESTMENT INITIATIVE

August, 1999

National Research Council

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This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council's (NRC) Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making the published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. We wish to thank the following individuals for their participation in the review of this report:

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While the individuals listed above have provided many constructive comments and suggestions, responsibility for the final content of this report rests solely with the authoring committee and the National Research Council.

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SECTION 1: INTRODUCTION

SUMMARY

The National Academy of Sciences/National Research Council (NAS/NRC), through its Center for Science, Mathematics, and Engineering Education (Center), has completed the Defense Reinvestment Initiative (DRI) project funded by the Department of Defense (DOD). The key objectives of the project have been to design, plan, implement, and evaluate a strategy to prepare professional scientists, mathematicians, and engineers from military duty, defense-related and aerospace industries, and national laboratories for careers in secondary school mathematics and science teaching. The DRI Advisory Board (DRIAB) and staff, in cooperation with administrators and teachers of Los Angeles Unified School District (LAUSD) and faculty and administrators at California State University, Long Beach (CSULB), designed a single subject teacher credential program that is aligned with content, teaching, and assessment standards for science and mathematics education. After the cohort of participants (DRI Fellows) had completed the formal credential program, two years of follow-up professional development and support were provided. An external evaluator was retained to evaluate the program.

Early in the project, DRIAB approved the following mission statement:

> *The NRC's Defense Reinvestment Initiative (DRI) will develop a model program in the Los Angeles Unified School District for the transition of science and engineering professionals into careers in secondary school science and mathematics teaching in inner city schools. DRI intends to provide a unique opportunity to develop a new teacher preparation and certification program that is aligned with education reform efforts in mathematics and science; create a way for professional scientists and engineers to become classroom teachers; combine teacher preparation with a strategy for placing new teachers in schools that are beginning to align their science and mathematics programs with these national education reform efforts; and enhance the classroom experience of those new teachers.*

The project received sixty-three applications, forty-one applicants were selected for interview and twenty candidates and four alternates were selected for the program. Of those, fifteen opted to participate and twelve completed the one-year credential program. During the next two years, three others left the teaching profession. Thus by December 1998, nine of the original fifteen Fellows were still teaching. Most were teaching in urban settings. The total cost for the program was $1,778,000, a significant portion of which was spent on start-up costs and in stipends for the Fellows.

During the course of the program, several challenges were encountered. A major obstacle was the difficulty that the Fellows had in passing the subject matter examination, Praxis. Two of the Fellows pursued the physical science credential and the remaining Fellows pursued the mathematics credential. All of the Fellows failed to pass their initial attempt, and by December 1998, only five of the remaining nine Fellows had passed the Praxis examination. Some of mathematics Fellows have yet to pass the examination, the two physical science Fellows eventually passed the test.

Another challenge was finding faculty and cooperating teachers who could mentor the Fellows and who modeled the various types of teaching described in the mathematics and science education standards. Some of the initial mentors were removed from this program because they themselves did not have a full California credential. Because of these issues, the professional development provided in the two years post-credential became a vital source of information and modeling on standards-based mathematics and science education.

Despite the small number of participants, some important insights were gained through this project:

- Careful selection of potential teachers may reduce the later attrition rate.
- Early introduction to the classroom for potential teachers, especially those who are choosing teaching as a second career, may also reduce the attrition rate.
- Gradual transition into independent teaching was reported by the participants to ease the stress of student teaching and first year teaching.
- Strong support mechanisms for new teachers can lead to a higher retention rate, but cannot completely overcome some of the negative aspects of first and second year teaching that are common in many school districts in the United States.
- Even individuals with strong science, mathematics, or engineering backgrounds may have difficulty passing the subject matter examinations required in California, and programs should address this issue at the outset.
- Individuals coming out of science, mathematics, and engineering careers represent a potential source of new teachers of science and mathematics, if they are prepared in a carefully constructed credential program that addresses the needs of mature learners.
- Education standards can be part of a single subject credential program, but care must be taken to address the fact that many older candidates are unfamiliar with or even hostile towards some of the ideas presented in mathematics or science education standards.

Recommendations for future programs include:

- **Recommendation 1. Carefully select candidates for teacher credential programs, even if it means that the program will not be completely filled.**

- **Recommendation 2. Encourage qualified candidates to enter teaching as second career program by providing adequate financial incentive.**

- **Recommendation 3. Provide early and frequent entry into the classroom for the potential teachers.**

- **Recommendation 4. Present both the recommended pedagogy and content matter together when it is relevant as well as in ways that model good teaching practices.**

- **Recommendation 5. Foster a sense of professionalism and importance of career-long learning in new teachers.**

- **Recommendation 6. Provide new teachers with a support system.**

BACKGROUND

In the early 1990s, the DOD began downsizing military bases and other operations which greatly affected the economy of Southern California. The aerospace industry was especially hard-hit. From 1988-1993, approximately 108,000 jobs were lost in aerospace in Los Angeles, Orange, and San Diego Counties.[1] This accounted for the loss of over $4 billion in wages and almost $3.5 billion in other indirect services. One-third of the unemployment claimants from aerospace were long-term unemployed, with especially high rates for engineers, scientists, and older workers. One-fourth of reemployed aerospace workers found jobs in retail and low-skill service industries. African American and Hispanic workers suffered from higher than average lay-offs and lower than average reemployment.

At the same time, Southern California schools were suffering a shortage of well-qualified mathematics and science teachers, especially in large urban centers such as Los Angeles. At the start of the 1993 school year, LAUSD had a shortfall of approximately 100 science and mathematics teachers.[2] Moreover, in many inner city secondary schools in Los Angeles, as well as other urban districts, over 50 percent of the mathematics teachers were not credentialed to teach mathematics.[3] In some cases, these teachers were teaching on an emergency credential and possessed a rich content background, but little knowledge of how to present the material to students, especially ethnically diverse students and students coming from impoverished environments. In other cases, these teachers were credentialed in disciplines other than mathematics, and thus did not have sufficient content expertise.

In 1993, as LAUSD prepared their Urban Systemic Initiative proposal to the National Science Foundation (NSF), teacher preparation and enhancement in mathematics and science was placed at the "highest priority."[4] LAUSD administrators and teachers were especially concerned with the quality and quantity of mathematics and science education in their inner city schools, the facts and figures of which coincided with those reported nationally.[5] In large urban school districts, fewer than 7 percent of high school students were taking advanced mathematics courses and fewer than 10 percent were taking advanced science courses. Among Hispanics and African Americans, the figures dropped to 2.7 percent for those taking advanced mathematics courses and 6.8 percent for those taking advanced science courses. Jane Butler Kahle, a noted science educator from Miami University of Ohio, has identified increased availability and enrollment in

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[1] International Association of Machinists and Aerospace Workers, data collected from diverse sources, 1994.
[2] Christopher Holle, United Teachers of Los Angeles, report to Planning Meeting, 1993.
[3] Los Angeles Unified School District Urban Systemic Initiative (LA-SI) report, 1994; Superintendent, Santa Ana School District, personal communication.
[4] LA-SI. Proposal submitted to the National Science Foundation, 1994.
[5] *Strategies for Success: Achieving the National Urban Education Goals.* The Council of Great City Schools, proceedings from meetings with representatives of 70 national education business and philanthropic organizations. 1991.

advanced mathematics and science courses as critical indicators of high-quality equitable mathematics and science education.[6]

It was in this context that the NRC convened a two-day planning meeting at the Beckman Center in Irvine, California to study the feasibility and potential design of a project which would offer displaced aerospace and defense personnel an opportunity to become well-qualified, effective mathematics and science teachers. Scientists and engineers leaving the military, defense-related industry, aerospace careers, and national laboratories were assumed to represent a potentially large pool of talent for career teachers who can teach according to the guidelines in the national standards for mathematics and science education. Appendix B is the report from the planning meeting. The issues addressed at the planning meeting were:

- types of alternative teacher certification programs that existed, primarily in California;
- credential or licensure requirements for teachers who enter the teaching work force through alternative certification programs;
- placement and employment opportunities in schools for scientists and engineers after the retraining period;
- support needed from the current employers of scientists and engineers wishing to make a shift into teaching careers;
- appropriate role(s) for the various players, including the NRC, colleges and universities, state credential board, cooperating school systems, federal agencies and laboratories, industry, and others; and
- key elements of successful certification programs.

PROGRAM SCOPE

The DRI project was divided into five phases plus the pre-award activities described above, as indicated in the following chronology of events.

Pre-award Activities

1993	October	Feasibility Discussion Group Meeting, Beckman Center

Phase I

1994	November	Initial Contract with DOD awarded
		Staff hired and DRIAB appointed
1995	February	First DRIAB Meeting
	March	Haberman Interview Training Workshop
	April	Applicant files reviewed
	May	Interviews with applicants
	June	Schools secured

[6] Jane Butler Kahle. Measuring Progress Toward Equity in Science and Mathematics Education. *NISE Brief*, Vol. 2, #3. August, 1998.

		Evaluator selected
		Fellows accepted
Phase II		
	July	Fellows began CSULB program
		Second DRIAB Meeting
	August	RFP for second cohort credential program issued
	September	Informational meeting for Proposal for Second Cohort
	October	Professional Development Seminar at California Museum of Science and Industry, Reception for Los Angeles Dignitaries
	November	Third DRIAB Meeting
Phase III		
	November	Site for Second Cohort selected
		Professional Development Seminar at California Institute of Technology
1996	January	Workshop for Cooperating Teachers
	June	Fellows began Student Teaching
	August	Fellows completed credential program
		Fourth DRIAB Meeting
		Professional Development Seminar at Discovery Museum's Launch Pad
	September	Most Fellows began teaching
Phase IV		
	November	First Saturday Seminar for Fellows
1997	February	Saturday Seminar for Fellows
	April	Two Saturday Seminars for Fellows
		Paper presented at National Association for Alternative Educator Preparation, Certification, and Licensure meeting, Norfolk, VA
	May	Fifth DRIAB Meeting
		Saturday Seminar for Fellows
	August	Summer Workshops for Fellows
	September	Two Saturday Seminars for Fellows
	November	Saturday Seminar for Fellows
1998	February	Sixth DRIAB Meeting (half-day)
		Two Saturday Seminars for Fellows
	March	Two Saturday Seminars for Fellows
	May	Saturday Seminar for Fellows
Phase V		
	September	Final DRIAB Meeting
		Final Report Drafted
		Two Saturday Seminars for Fellow (following amendment to contract)
	December	Mentoring Workshop for Fellows (following amendment to contract)

SECTION 2: OVERVIEW

THE DRI PROGRAM

The results of the planning meeting led the NRC to respond positively to the DOD's interest by submitting a proposal for a pilot project in LAUSD. The proposal addressed four perceived critical needs:

- the need for teacher preparation and credential programs that incorporate lessons learned from current education reform efforts, especially national education standards in science and mathematics;
- the need for ongoing collaborative relationships between colleges and universities and school districts in the area of teacher preparation and credentialing;
- the need for a large number of well-prepared science and mathematics teachers in inner city schools; and
- the need for an enlarged cadre of teachers of science and mathematics who can serve as leaders of education reform.

The key objectives of the pilot program were to:

- create a new teacher credential program that prepares teachers to teach in ways called for by major education reform initiatives;
- give scientists, engineers, and mathematicians who are interested in teaching an opportunity to participate in the new program and become certified to teach science or mathematics in middle school or high school;
- place those well-prepared science and mathematics teachers in schools where science and mathematics education is in the greatest need of improvement and support and where there is recognition that change is needed;
- link experienced expert teachers with the newly prepared teachers to provide ongoing support for the new teachers; and
- monitor the new teachers and the master teachers over an extended period of time to assess their contributions to reform efforts in LAUSD.

The site of the pilot program was LAUSD, in particular, schools in South Central Los Angeles. A list of the schools selected to participate is given in Appendix C. The site was selected because of the diversity of its student population and its proximity to military and industrial sites whose work force needs were changing. LAUSD is the second largest school district in the nation, representing 28 cities in Los Angeles County. Based on 1991-1992 figures[7], 12.5 percent of all students enrolled in California public elementary and secondary schools attended schools in LAUSD. Of those, 65.1 percent were Hispanic, 14.6 percent were African-American, and 7.7 percent were other ethnic minorities. LAUSD had been selected as one of the cities eligible to compete for a NSF Urban Systemic Initiative (USI) and had a USI development team in place. Subsequently, LAUSD was awarded USI funding.

[7] *LAUSD Information*, 1994.

The guiding principles behind the construction of the DRI proposal were those found in the professional development standards in mathematics and the then draft standards for science that call for:

- teachers to learn teaching through experiences aligned with standards for students;
- a coherent program connecting knowledge of science and mathematics with pedagogy; and
- an understanding of the human development of children and youth.

The initiative incorporated lessons learned from other programs that were designed for mid-career moves into teaching and added several key elements. These elements provided exposure to the teaching profession early in the program, strongly emphasized the role of expert teachers (called Cooperating Teachers), and recognized the importance of the school environment in which the participants were placed.

The NRC selected CSULB as the education partner of the program because the California State University System is California's largest system of teacher education and credentialing. The CSU System credentials 11 percent of the nations total teaching force.[8] CSULB, in particular, had experience in second-career teacher certification programs, was reputed to maintain a close cooperation between the colleges of science and education, and had an excellent relationship with LAUSD and the Commission on Teacher Credentialing (CTC).

Additional important elements of the DRI program follow.

- The DRIAB, CSULB faculty, and DRI staff worked closely with the CTC to ensure that the program met all requirements for the California teaching credential.
- Staff worked closely with LAUSD to ensure that teaching positions were available to the Fellows at the completion of the program. The program was designed to conform to the best practices identified by national education reform strategies. National standards were proposed to be the basis for teacher preparation and student learning, with a content-based pedagogy that was customized for the DRI Fellows. Active programs of observation, mentoring, coaching, reflection, and cooperative learning among participants were proposed in order to promote effective teaching and appropriate assessment of teaching and learning processes.
- The DRI Fellows were given adequate time to explore all of the career change issues they were about to make; for example, decisions about the grade level (middle or high school) at which they wished to teach, the realities of classroom management and teaching in an inner city school, expectations about salary and instructional materials, facilities, and human resources.
- The program intended to foster collaboration among the teachers; the participating university science and education faculty; and the university, schools, and school district involved.
- The program was to promote leadership development for the experienced teachers as well as the DRI Fellows.
- Financial support, a $22,000 stipend, was provided to the Fellows as they progressed through the first year of the program.

[8] California State University Fact Sheet, California State University Chancellor's Office.

- The group of Fellows was organized as a cohort that continued to function as such throughout the program.

The original proposal to the DOD, funded at $5 million, included two cohorts of teaching Fellows, 20 participants in the first cohort, 40 in the second. In order to accommodate the increase in number of participants, a request for proposals was to be issued to all colleges and universities in the Los Angeles area. However, in FYI 1996, the DOD, because of governmental budget reductions, declined to fund support for a second cohort of Fellows. Funding for the support systems for the first cohort of Fellows remained intact, however. During this time, which was the first two years of teaching, the Fellows attended monthly meetings throughout the academic year and were provided with opportunities for summer workshops and travel to professional teachers meetings. The total cost of the program over the period of four years and two months was $1,778,000.

The continuity of the evaluation process by an external evaluator was maintained for the duration of the program. Regular formative evaluations were provided so that changes could be made when necessary. The yearly assessments and reports were submitted to staff and the Advisory Board and the Evaluator's Final Report includes the major findings from the whole of the project. The Final Report from the external evaluator is available as Appendix D. It should be noted that the external evaluator was directly involved in the program at various stages. For example, the evaluator had several private meetings with the Fellows together as a group as well as individually, he attended the DRI Advisory Board meetings, and had telephone calls and email correspondence with the NRC staff. In the statement of work to DOD, the external evaluator was to provide both a formative and summative evaluation of the project. The feedback of the evaluator during the project helped the Advisory Board and staff make changes that would help improve the Fellows as they progressed through the project.

DEFENSE REINVESTMENT INITIATIVE ADVISORY BOARD

The Defense Reinvestment Initiative Advisory Board (DRIAB) was formed to provide guidance for the project. The majority of DRIAB members were from the Los Angeles area and had experience in science and mathematics education at a state and national level. For example, membership included the President of the National Council of Teachers of Mathematics, the Acting Director of the California State Systemic Initiative, and the Co-Principal Investigator of the Los Angeles Urban Systemic Initiative. There were also representatives of teacher preparation programs; mathematics and science teachers; school, state, and district administration; scientists and mathematicians; and the community at-large. Appendix E is the roster of appointments to DRIAB for the duration of the project.

From February 1995 through September 1998, seven DRIAB meetings were held. Attendance at the meetings ranged from 55 percent to 80 percent of the membership. Attendance varied according to the time of the year of the meetings, with fall meetings being attended more than mid-winter meetings, and according to the length of notification about the meeting. Guidance from DRIAB was also sought between meetings through consultation with the Chair and Vice-Chair and through e-mail and fax with the entire committee.

DRI FELLOWS

Recruitment

An active recruitment and public awareness campaign which incorporated the following strategies was instituted.

- Contact was made with the separation transition units on the Los Angeles area military bases. A presentation was made at the El Toro Marine Base. The DRI staff was placed in contact with interested people on the Los Angeles Air Force Base via e-mail.
- A targeted news release was sent to local newspapers, aerospace-and defense-industry company newsletters, and national publications of interest to the military (e.g., *Army Times*) or to aerospace engineers (e.g., *Electronic Engineering Times*). Appendix F includes the news release announcing the program and examples of press coverage.
- Los Angeles area Private Industry Councils (PIC) were contacted and a presentation was made at the Verdugo Hills PIC.
- Letters and brochures were sent to Human Relations offices associated with local industry.
- A flyer was placed in the pay envelopes of Los Angeles Unified School District. This was one of the more successful recruitment strategies.
- A recruitment brochure was sent to interested people (also included in Appendix F).

Media coverage was more extensive than originally anticipated and engendered an editorial in the *Los Angeles Times* urging more of such programs.[9]

> *"I have always wanted to teach, but couldn't get out of the rat race long enough to get the proper credentials," said one aerospace engineer who responded to a newspaper story. "Although I'm being forced out, I'm now looking forward to a whole new career. I worry about taking a pay cut, but I think teaching will have other rewards."*

Selection

Because several reports have indicated that one reason for teacher burnout is a feeling of isolation, and that the most effective teachers are those who communicate with one another[10], DRIAB recommended that the Fellows have, in addition to their academic qualifications, the following qualities: aptitude for team building, ability to form and work within a support group, ability to engage in discourse. Moreover, because the teachers were being encouraged to teach in Los Angeles inner city schools, where there is a diverse student population, sensitivity to issues of

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[9] "A Retraining Program that Adds Up". Orange County Perspective, Los Angeles Times. Sunday, August 20, 1995.
[10] Mary Jane T. Pearson and Bill Honig. *Success for Beginning Teachers.* California Department of Education, Sacramento. 1992; National Commission on Teaching and America's Future. *What Matters Most: Teaching for Ameria's Future.* 1996; National Research Council. "Science Teaching Standards". *National Science Eduation Standards.* National Academy Press. 1996; Martin Haberman. *Star Teachers of Children in Poverty.* Kappa Delta Press. 1996.

access and equity are important. DRIAB members also recommended active recruitment of women and minorities to serve as role models for a diverse student population.

Application forms were developed using guidelines from other NRC Fellowship programs and the required CSULB forms. Approximately 250 applications were sent to individuals and groups after being requested. Sixty-three completed applications were received. Of these applicants, seven described themselves as African-American, six as Hispanic, 11 as Asian, 34 as White, three as "Other", and two declined to answer. Fifty-seven applicants were male and six were female, a proportion which reflects the population from which the applicant pool was drawn. A selection panel consisting of DRIAB members, representatives from LAUSD and CSULB, and DRI staff read the completed applications. Each application was read by three individuals and given a numerical rating. The rating criteria follows:

- Interest in and dedication to entering teaching; e.g., registration for or completion of examinations required for certification, participation in activities involving children, or some experience in teaching children or adults;
- Knowledge of or sensitivity to the urban school setting as evidenced by practical, realistic comments in the personal statement;
- Experience in working effectively in a team situation;
- Strong content background in mathematics or science; and
- Breadth of background in coursework and interests.

The top 45 applicants were invited for interview. Four declined the interview. Of those interviewed, four described themselves as African American, six as Hispanic, seven as Asian, 23 as White, and one as "Other". Of this group, 38 were male and three were female.

The DRIAB approved the use of the Haberman Urban Teachers Selection Interview (Appendix G). The Interview has been used by several large school districts to select teachers who will be most likely to be successful in an urban setting. Ten members of the LAUSD personnel department, one representative from CSULB, five DRIAB members, and two DRI staff participated in a one-day training session for the interview. Two trained interviewers interviewed each of the 41 candidates. The Haberman Interview evaluates candidates using a numerical rating system based on persistence in problem solving, willingness to support student learning in the face of or even against school policy, ability to put ideas into practice, reaction to "at-risk" students, professionalism in orientation to students, ability to cope with potential burnout, and ability to accept and deal with their own human fallibility. These criteria were developed by Dr. Haberman after years of studying successful and unsuccessful teachers of inner city children in poverty.

Twenty DRI Fellows and four alternates were chosen on the basis of the scores from the reading panel and the scores by the interviewers. Of this group, three asked to defer until the next cohort (one because of previous summer plans, two for health reasons), two decided to continue as aerospace consultants, two decided that the driving/travel time was prohibitive, one decided to enter another certification program, and one had been still employed in aerospace and decided not to leave.

Profile of the Fifteen DRI Fellows, 1995

Average age:	48
Ethnicity:	two African American, one Asian, five Hispanic, seven White
Gender:	one Female, 14 Male
Education:	nine Bachelor's in an engineering field; three Master's in an engineering field, one Bachelor's in Mathematics, one Bachelor's in Physics, one Bachelor's in Economics
Previous Employment:	All were previously employed in aerospace
CBEST[11]:	seven passed, six had not yet taken[12]
Language other than English:	five Spanish, one Farsi, one German, one French

> *"I spent time in the military and in the defense industry," said one newly recruited DRI Fellow, who was a former Air Force colonel. "I know that the United States is going to need a technologically capable, scientifically literate populace, and I am now in a position to be able to affect the education of the citizens of tomorrow."*

Table 1 compares the average score each Fellow received from reviewers of the applications, the average score for the Haberman Interview, and the status of the Fellow as of December 1998. As can be seen, having a low score in one or both of the selection methods did not necessarily predict which Fellows would leave the program or be successful in their teaching. In fact, the person with the lowest score after application review and the person with the lowest interview score are both successful teachers in inner city schools. It should be noted, however, these represent the highest scores among the 41 candidates interviewed.

> *DRI Fellow P.P., who came to the United States as a poverty-stricken teenager from South America, recalls what it was like going to school with only limited English skills. "I want to be a role model and show [the Hispanic students] that it can be done," he said. "That they can make a good life for themselves through education."*

[11] California Basic Education Skills Test. Passing this test is required for all teachers in California.

[12] All six took the examination before beginning the program or shortly thereafter and all six passed on the first attempt.

Table 1. Application and Interview Scores of the DRI Fellows with Their Status at the End of the Project

DRI Fellow Reference Number	Average Written Application Score (4.0 possible)	Haberman Interview Score (45 possible)	Status as of December 1998
1	3.9	38.88	Teaches math full-time, LA urban high school
2	3.67	37.0	Taught math full-time in two LA urban schools, currently teaches part-time in LA adult school
3	3.57	31.3	Teaches math full-time, Long Beach continuation high school
4	3.27	38.25	Left program after one year of teaching in urban middle school due to dislike of teaching
5	3.27	35.88	Teaches math full-time in LA urban high school
6	3.15	33.88	Teaches math part-time in LA adult school
7	3.13	33.68	Left the program before student teaching due to unwillingness to complete credential requirements
8	2.9	29	Left program after one year of teaching in urban high school because of personal financial reasons
9	2.6	28.25	Left program after two months for personal reasons
10	2.6	23.25	Teaches math full-time in LA urban middle school
11	2.5	30.13	Was dismissed from the program because of poor reviews by Cooperating Teachers
12	2.47	34.13	Teaches chemistry full-time in Pomona suburban school
13	2.43	32.88	Substitute taught in various urban and private schools, currently on medical leave
14	2.37	38.88	Teaches math full-time in Orange County urban school
15	2.04	27.63	Teaches math and science full-time in LA urban school

Progress

During the credential phase of the program, each Fellow received a stipend of $22,000. Since most people who go into teaching as a second career get no stipend at all during the transition, and most of the Fellows had been out of work or had been working at low paying jobs, the stipend was viewed as an added bonus to the certification. Some applicants still worked in aerospace at higher salaries than the stipend, and applied because they feared for their jobs. The Fellows felt this stipend, more than most programs, was adequate for expenses while transitioning into a new career. The CSULB fees for the credential program were also paid for through the DRI subcontract with CSULB.

Three DRI Fellows did not complete the credential program. One resigned early in the program due to personal reasons. A second was asked to leave the program before the student teaching period because of several poor evaluations from his Cooperating Teachers. A third returned to the engineering field, having become disgruntled about the California credentialing requirements.

Two of the remaining 12 Fellows chose physical science as a credential subject, ten Fellows chose mathematics. The California Commission on Teacher Credentialing requires proof of subject matter competence in order to obtain a single subject teaching credential. Unless a candidate has recently completed an approved course of study in the discipline, two tests are required. The first test is the "Single Subject Assessments for Teaching" (SSAT), which is a multiple-choice question examination administered by National Evaluation Systems. All teaching candidates must pass this examination. The second test is the problem-oriented "Praxis Series: Professional Assessments for Beginning Teachers" administered by Education Testing Service. This examination is single subject based. The Praxis test proved to be a considerable stumbling block, especially to the Fellows in mathematics. If a candidate has an undergraduate degree in the subject matter, they can waive taking this examination, but for all other non-majors regardless of their past subject matter coursework, they are required to pass this examination. The two Fellows who took the physical science credential did not experience the same long-term failure of passing their Praxis examination. When none of the Fellows passed the Praxis examination at the first attempt, it became their major focus, which made any other activities peripheral in their view. In fact, the overall cumulative pass rate for all participants taking the mathematics Praxis examination is 15.1 percent. [13] Because CSULB had previous experience in programs for adults choosing teaching as a second career, some difficulty for the Fellows in passing these examinations was anticipated and planned for. The CSULB program included a course in discreet mathematics offered by a mathematics professor during the introductory summer session. It also included structured time when the Fellows could tutor each other, called 'Operation Bootstrap.' However, the version of the Praxis examination which the DRI Fellows took was new and the Fellows were among the first groups to take the current version. Therefore, planning for the coursework and tutoring was based only upon assumptions about what might be on the examination. After the first unsuccessful attempt at the Praxis examination, mathematics or physical science graduate students were hired to

[13] Brunsman, Bethany A. and Robert E. Carlson. *Annual Report on the Praxis and SSAT Examinations in English, Mathematics, and Social Sciences December 1995-June 1998*. California Teacher Credentialing. Sacramento, April 1999.

tutor the Fellows on identified areas of weakness. During the second half of the program at CSULB, a tutor was hired who specifically tutored toward passing the Praxis examination. By the end of 1998, four of the remaining mathematics Fellows still have not passed Praxis. None have made an attempt at re-taking the test since they began teaching. Of the two who are employed in full-time teaching positions, one has completed all coursework in mathematics to fulfill the credential requirement without taking the Praxis examination, the other has begun to do so. The remaining two are teaching part-time or substitute teaching, one in adult school.

As the Fellows entered their first year of teaching, five were employed full-time in LAUSD inner city schools. Of the others, most were employed in urban schools. The average starting salary was $30,343. Two Fellows left the program after one year, one for personal financial reasons (although he wishes to return to teaching eventually) and one because she found she did not like the constant challenge of classroom management, the politics of school administration, and teaching, in general. After two years of teaching, five Fellows remain employed at their original school, two are employed full-time at schools other than their original school, two are teaching in adult school, and one has taken a hiatus from teaching due to health problems.

> *One of the Fellows who left after one year of teaching said, "I am grateful to the DRI program for renewing the confidence and discipline I thought I had lost in the intervening years since my previous college experiences. I think it takes a special 'gene' to be a teacher, and I just didn't have it and couldn't develop it."*

Throughout the project, several Fellows reported that they had offers to return to the aerospace industry on either a permanent or temporary basis. The Fellows declined these offers. In the final stages of the program, the external evaluator asked the Fellows about their plans to remain in teaching. All nine of the remaining DRI Fellows said that they plan to remain in the field for the rest of their career, whereas less than 60 percent of teachers nationally give that response.[14]

According to the program evaluator, as the program progressed, there was a significant positive shift in the Fellows' attitudes toward the methods of teaching which are congruent with recommendations of national and state education reform documents. In the Year One Report, the evaluator reported that five of the 15 Fellows had negative attitudes about the teaching methods endorsed by state and national reform documents. In the Year Two Report from the same evaluator, ten of the remaining 12 Fellows reported that they were "anxious to try these techniques out" on their "own" students. The remaining two categorized themselves as "receptive" to using less traditional methods. The factors for this change included the Fellows' observation of student excitement when the more interactive methods and curricula were used versus the student boredom when the teaching was more traditional, as well as the boredom felt by the Fellows themselves after spending time in a traditional classroom.

By the end of the Fellows' second year of teaching, the program evaluator noted that most of the DRI Fellows were not only basing almost all of their preparation, delivery, and assessment

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[14] Jainping Shen. "Has the Alternative Certification Policy Materialized Its Promise? A Comparison Between Traditionally and Alternatively Certified Teachers in Public Schools". *Educational Evaluation and Policy Analysis*, Vol. 19, # 3, Fall, 1997.

practices on the standards, but many were encouraging other teachers in this direction as well. He observed that there was a good flow of pedagogical, content, student exercise and activity information, and materials among the Fellows themselves.

As indicated in Table 1, seven Fellows are currently teaching full time in Los Angeles or Orange County public schools. Two Fellows are teaching part-time in LAUSD adult schools, the clientele of which are predominately young adults who previously dropped out of high school. Two of the Fellows who are not currently teaching have expressed a desire to re-enter the teaching profession when personal situations allow them to do so. The loss of three Fellows during the CSULB credential program is not unexpected nor unusual. In any classroom situation, there will be those who will not complete for a variety of reasons. When comparing the attrition rate of the remaining 12 Fellows who actually entered teaching, the rate is lower than that reported in national studies.[15] The external evaluator attributes these results to several parts of the program (Appendix D):

- Early classroom observation
- Cooperative Teaching
- Two year follow up
- Active participation by the DRI Program Office

The accomplishments that the Fellows are experiencing is worth noting. Both the external evaluator and the DRI staff report that administration and teachers at the schools where the Fellows are teaching speak well of their teaching skills, content knowledge, and leadership capabilities. According to the external evaluator, the Fellows have gained seniority and are exerting more influence within their departments. One is developing his schools's first honor's science course. Two Fellows are chairing school-wide committees.

> *An Assistant Principal at Bell High School in South Central Los Angeles recently said, "We were so honored and pleased to have been one of the DRI training sites, because this is one of the few programs that have addressed the needs of urban schools. We immediately hired DRI Fellow Mr. E. G. when he completed his credential, and we have not regretted it. He is one of our top mathematics teachers. I wish we could have worked with another cohort of DRI Fellows."*

THE CSULB CREDENTIAL PROGRAM

On July 10, 1995, 15 Fellows began the program at CSULB. The course of study was planned through the formation of a Campus Advisory Group made up of faculty from the Mathematics Department, including mathematics educators, the Science Education Department, and the School of Education. According to Dr. William Ritz, director of the program at CSULB, this marks the first time these faculty members have taken the opportunity to meet together and plan a coordinated program. The Campus Advisory Group continued to meet throughout the year to design and implement coursework specifically for the DRI Fellows. Although the curriculum

[15] Ibid.

contained all of the elements of the traditional credential program at CSULB, the courses were divided into modules so that the Fellows could spend more time at the school sites than is usually possible in traditional credential programs. Throughout the program, from the first week in the summer introductory course through student teaching, the Fellows spent a minimum of two full days in the schools. Some coursework was provided that satisfied the Cross-cultural, Language and Academic Development (CLAD) credential.

The Fellows were placed in cooperating schools within the first week of the program. A flow chart of their in-school responsibilities is shown in Figure 1. They began by observing teachers of mathematics and science at the middle school and high school levels. It was mandatory that they visit at least one middle school and one high school during the course of the introductory summer class. The classroom observations were directed in that there were particular assignments to be completed at the school sites that corresponded to the CSULB coursework.

> *"I expected the school to be depressing, with unruly, unmotivated kids," said DRI Fellow K.H.K., who spent his first day at Berendo Middle School near downtown Los Angeles. "The school is like an oasis in the middle of some of the worst Los Angeles gang territory. It is obvious that discipline is stressed and the kids regard the school as a safe haven, where they can engage in the fun of learning. I loved every minute of it – the kids and the teachers were great!"*

The next stage of their fieldwork in schools included working with individual students and small groups of students so that they could begin to understand how students learn. Under the supervision of a Cooperating Teacher, Fellows were given assignments for interviewing students on specific topics, tutoring individual students, and observing and facilitating groups of students. These experiences were then reported on and discussed during university class time.

A third stage was cooperative teaching with an experienced teacher. In an effort to make a smooth transition from the observation phase to eventual student teaching, Fellows were paired with one or two Cooperating Teachers at one of the school sites. The concept of cooperative teaching was that the Cooperating Teacher and the DRI Fellow would work together on certain lessons so that the Fellow could gain confidence in lesson preparation, delivery, and assessment. The Fellow and the Cooperating Teacher were encouraged to jointly prepare lesson plans, team teach, and develop strategies where one could support the presentation of a lesson by the other through leading discussions, answering questions, or setting up demonstrations. Since this was a unique concept, Cooperating Teachers were asked to be innovative in conducting this part of the program. Participation by the Fellow in classroom management, such as seating and roll taking, was also encouraged. A workshop for the potential Cooperating Teachers was held in order to inform them of the intent of this phase of the program – innovative in that it is less structured than most student teaching experiences and allows for a gradual introduction to conducting a lesson. At the workshop, CSULB faculty explained their expectations for cooperative teaching and the group played out several scenarios. These scenarios were intended to dramatize potential problems or favorable outcomes that might occur during cooperative teaching.

Finally, the Fellows completed traditional student teaching, during which they took complete responsibility for three class periods every day for a period of two months while being supervised by an experienced classroom teacher. The time-period of student teaching was somewhat shorter than normal because of the cooperative teaching experience undertaken by the Fellows.

Figure 1. The Transitioning of in-school Experiences and Responsibilities for the DRI Fellows during the CSULB Credential Program

Phase	General Observations to Get Acquainted	Focused Observation & Interviews	Teacher Aide	Cooperative Teaching	Student Teaching
Activities & Duties	Look & listen, tour the school, meet the teachers and administration	Interview teachers & students, use forms to make focused observations, debriefing in group	Assist the teacher, tutor students, observe	Cooperatively plan & teach, design assessments, award grades	Traditional student teaching duties at two different sites & classrooms

For all of the stages described above, an effort was made to place the Fellows in inner city schools that had good mathematics and science programs and with Cooperating Teachers who would model the pedagogy called for by national and state reform documents. Recommendations of such schools were solicited from the Los Angeles Urban Systemic Initiative staff. Eight schools, most of which were in South Central Los Angeles were selected (Appendix C). They were all year-around schools. A teacher who served as a site coordinator was appointed in each school to assure that the program had structure within the school and that the Fellows were placed with the appropriate teachers. The site coordinator was recommended by the principal or assistant principal of the school and had the duty to represent the program in recommending and recruiting teachers who would serve as Cooperating Teachers. The idea behind appointing a site coordinator was that on-site teachers knew better which teachers would model standards-based teaching in mathematics or science and could appropriately recommend those teachers. The site coordinators also served as points of communication between CSULB faculty and the teachers.

PROFESSIONAL DEVELOPMENT ACTIVITIES

Activities During the Credential Program

One desired outcome of the program, as expressed by the DRIAB, has been to enhance the awareness of and positive attitudes toward life-long professional development among the Fellows. To that end, several activities were offered during the credential program. These activities were

designed to inform the Fellows about the opportunities for professional development available to teachers. They included hands-on, inquiry-based activities at the California Museum of Science and Industry and a special program presented by the Discovery Museum of Orange County. They also attended a one-day workshop at the California Institute of Technology, during which the Fellows met with Drs. Tom Apostol, developer of the *Mathematics!* Program, David Goodstein, developer of *The Mechanical Universe*, and Gil Clark, Director of *Telescopes in Education.*

Follow-up Support Activities

In studies of teachers newly inducted into the profession[16], new teachers report feelings of being overwhelmed, isolation, and self-doubt. Moreover, beginning teachers are often reluctant to seek advice and help from their principals or more experienced teachers for fear that they will be viewed as incompetent. These feelings lead to a high attrition rate within the first few years of teaching. Thirty percent of new teachers leave California's metropolitan and rural schools after one year of teaching. Nationally, the figures are similar, with more than half leaving after five years, constituting a waste of human and financial resources, as well as severe hardship on schools and students. Therefore, a number of activities were designed by the DRIAB and DRI staff to provide support for the DRI Fellows as they made the difficult transition into urban classrooms. The DRIAB perceived several potential needs of new mathematics and science teachers, especially those entering the field as a second career. Mathematics and science teachers need:

- to be able to view teaching as a profession;
- assistance in dealing with pedagogy and classroom management;
- updates in content, and how to use their content knowledge to the best advantage of their students;
- opportunities to learn about and participate in the discussions around current issues in teaching mathematics and science;
- opportunities to have meaningful discourse with other teachers about teaching and learning in their content areas;
- opportunities to reflect upon and evaluate their own teaching practices; and
- opportunities to view teaching as a continuum of life-long learning.

The aim of the follow-up activities, which occurred in the two and one half years following the credential program, was to address some or all of those needs. The follow-up activities took the form of several Saturday Seminars and workshop activities, funding for tuition and fees for courses to enhance the credentialing and employment opportunities of the Fellows, funding for travel to professional teacher meetings, funding for substitute teachers for visits to other Fellows' classrooms, and provision of literature about teaching and learning in mathematics and science.

Saturday Seminars

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[16] Mary Jane T. Pearson and Bill Honig. *Success for Beginning Teachers*. California Department of Education, Sacramento. 1992; National Commission on Teaching and America's Future. *What Matters Most: Teaching for American's Future.* 1996

A total of 15 half-day Saturday Seminars were held from November 1996 through September 1998. In order to garner the support of the principals where the Fellows began teaching, they were sent letters explaining the program. For the first year of the Saturday Seminars, the sessions were held at the various schools where the Fellows were teaching. Each Fellow was asked to bring another teacher from his or her school to every Saturday Seminar and unlimited attendance by teachers at the host school was encouraged. One session each year was an unstructured session at which the Fellows were invited to share concerns and ideas about their teaching experience. The various other sessions dealt with the following topics:

- the Third International Mathematics and Science Study (TIMSS) and its purpose as well as the videotapes of various classrooms which could be used as a vehicle for discussion and reflection upon teaching practices;
- assessment practices in mathematics and science;
- designing enhanced classroom presentation of mathematics and science concepts, through an understanding of inquiry, real-world applications of concepts, and the use and availability of instructional materials;
- gangs and gang violence; and
- classroom-based research (sometimes referred to as action research) to design potential classroom- based research projects for their own classroom.

During the course of two years of Saturday Seminars, the discussions became more substantive. By the middle of the second year, discussions among the Fellows focused around standards-based teaching, alternative ways to present particular material, and alternative assessment strategies, rather than purely classroom management issues. The two-year development of the DRI Fellows from engineers who were just introduced into the classroom to professional teachers was dramatic.

Travel to Professional Teachers' Meetings

The opportunity to be reimbursed up to $500 for travel to a national or regional professional teachers meeting was offered to the Fellows for each of their beginning two years of teaching. This amount was increased to $1,000 in the fall of their third year of teaching. Attendance at meetings with other teachers of the same discipline enhances the professionalism of teaching, promotes leadership development, and encourages good teaching practices. In the first year that this opportunity was offered, only two Fellows attended professional meetings. This number increased to six in the next two years. Those that did not take advantage of the opportunity cited that they could not get away from their school or they could not leave for family reasons.

> *DRI Fellow D. M., a Chemistry teacher who attended the NSTA meetings, said, "I learned a lot, much of which I can use right away in the classroom. I also came away with a carload full of 'freebies' for classroom use! I want to thank the NRC for making it possible for me to attend."*

Summer Workshops

Another planned activity for the Fellows was that they attend summer workshops for content enhancement and leadership development. Upon advice from the DRIAB members, the Fellows were given an opportunity to enroll in either the California Mathematics Project Summer Institute or the California Science Project Summer Institute, both at University of California, Irvine (UCI). The DRI project paid for the registration fee, enrollment fee, and the university credit fee for all Fellows who participated. The Fellows were also paid mileage and $60 per day for each day of attendance. The first summer, three Fellows attended the mathematics institute and one Fellow attended the science institute. In addition, one Fellow attended a mandatory summer institute conducted by his high school for which he was paid by his district. Two Fellows took courses during the first summer to complete requirements for their full teaching credential. Two Fellows were unable to attend the summer institutes because they were teaching in year-around schools and were "on-track" at the time. One of those teachers subsequently took a university course when he was "off-track."

In the second summer, the needs of the Fellows had begun to diverge and they were allowed to choose the type of summer activity which best suited their needs. One Fellow chose to attend the UCI Science Project Institute for a second year. One Fellow attended a workshop on integrating mathematics and science that was paid for by his school. DRI paid for him to receive college credit for the workshop. Data is still being received at the time of writing of the report, but least three Fellows took courses that furthered either their content knowledge or advanced their teaching goals.

Leadership Institute

The culminating activity of the DRI professional development activities was a Leadership Institute conducted by the University of California, Los Angeles Mathematics Project. The two-day institute focused on supporting, mentoring, and coaching new teachers. Up to three other experienced mathematics or science teachers from each of the Fellows' schools were invited to attend. DRI paid for substitute teachers for each attendee.

In order to encourage the schools to avail themselves of these Institute-trained teachers, one-day of substitute time was paid to each school for releasing new teachers to visit the experienced teachers' classrooms.

Other Opportunities Offered

Other enhancements of the DRI Fellows' teaching experiences were also offered:

- Several books and publications were ordered for the DRI Fellows to enhance specific professional development activities. For instance, all three of the NCTM mathematics education standards plus the Addendum series were provided to the mathematics Fellows, and the NRC's *National Science Education Standards* as well as *Teaching About Evolution and the Nature of Science* were given to the science Fellows.
- Membership in the NCTM and the California Mathematics Council or NSTA and the California Science Teachers Association was purchased for one year for each Fellow. At the time of the

writing of this report, at least seven Fellows have maintained their membership in the professional societies.

- DRI paid for reimbursement of registration fees for one course for each Fellow that would satisfy requirements for obtaining a full California teaching credential. Most Fellows who took advantage of this opportunity took a required course in mainstreaming developmentally challenged students. Others took courses toward the CLAD requirement.
- Upon recommendation from the DRIAB, each Fellow was offered the opportunity to visit the classroom of another Fellow. By observing and being observed by peers, new teachers especially, tend to be more reflective about their own practices. The DRI worked with the principals of each school to reimburse the schools for the cost of a substitute teacher.
- A grant of up to $300 was offered to each Fellow to conduct classroom-based research. The purpose was two-fold; first, the Fellows were given experience in small grant writing, and second, the Fellows were encouraged to participate in classroom-based research.

Every Fellow took advantage of more than one of the opportunities offered, although, for most activities participation was low. The Saturday Seminars were the activity attended most, with five of the Fellows attending all 15 sessions and one missing only one session.

SECTION 3: CHALLENGES ENCOUNTERED AND LESSONS LEARNED

Recruitment and Selection of DRI Fellows

The fact that only 15 could ultimately be recruited, while funding was available for 20 Fellows, indicates that more than four alternates could have been designated. The interview process was especially selective, the 24 candidates selected were the only ones that "passed" the interview according to the interview criteria. The Haberman Interview is designed to screen candidates who are suitable for teaching in an urban setting, and does not claim that those who do not pass the interview would not be successful in other settings.

Scientists, mathematicians, and engineers represent a good pool of potential mathematics and science teachers, especially when the economy is such that a high percentage of these professionals are in danger of losing employment. However, most of this group are accustomed to considerably higher salaries than can be earned by teachers and are reluctant to enter the teaching field. In the DRI project, the majority of the final candidates had another connection to teaching, such as spouses or other relatives who were teachers, and were already prepared for the realities of a lower salary schedule.

Progress of the DRI Fellows

The difficulty the mathematics Fellows had in passing the subject matter examinations had not been anticipated and led DRIAB to consider how this might be overcome in future programs. Often, the timing of funding and getting programs underway does not allow the luxury of admitting only those people who have already passed the requisite examinations. Therefore, choosing individuals who have appropriate broad-based coursework, such as a bachelor's degree in mathematics, is one approach. Another, more realistic approach, is to require the participants to take the examination early and try to ascertain their weaknesses. Extensive tutoring, targeted toward these weaknesses, can then be provided. Although the DRI provided tutoring, the amount of which varied from Fellow to Fellow, based on self-perceived needs, only late in the process was this tutoring targeted specifically at the Praxis examination. After the first round of failure passing the Praxis, the project should have focused more time on coaching the Fellows for this test, regardless of their self-perceived needs.

It is difficult to believe that engineers would not have a good grasp of high school mathematics, and indeed, the two Fellows who are taking mathematics coursework in lieu of Praxis have received grades of A's and B's. In trying to determine the reasons for the difficulties that the mathematics Fellows encountered in passing the mathematics subject matter Praxis, a correlation was attempted between coursework and ease of passing the Praxis and undergraduate grade point average and passing the Praxis. No correlation was found in either case. Nor was there any correlation between college major and passing.

The Praxis examination that the Fellows took was a newly developed version and nationally the pass rate was very low. As noted earlier, the overall cumulative pass rate for all participants taking the mathematics Praxis examination is 15.1 percent. Because mathematics majors are waived from taking the Praxis due to their extensive coursework in the subject matter, this statistic is for non-majors. The Fellows related that the Praxis examination tended to present open-ended

problems that were not particularly similar to the ones in a practice examination supplied by the developer. They were also administered in a timed environment.

The CSULB Program

Working with schools in a large urban school district presented significant challenges. In most schools, the administration preferred to take the responsibility of recruiting the teachers to be involved, and, although the principals and assistant principals understood the program and were cooperative and enthusiastic, the message was not well translated to the potential Cooperating Teachers. Although the site coordinators were helpful, some did not seem to understand, or chose to ignore, the goals of the program. Although the DRI and CSULB staff tried to stress that the Fellows should be placed only with those teachers who had an understanding of standards-based teaching and curriculum, too often the placement was only with teachers who volunteered or were selected by the Fellow. Many of the Fellows were most comfortable with a traditional style of teaching and therefore would request a more traditional type of Cooperating Teacher with whom to work. The program leadership stressed from the beginning that that comfort zone needed to be stretched. In retrospect, more extensive and earlier groundwork should have been laid, in the form of workshops or meetings, for which the Cooperating Teachers or their substitute teachers were paid. A staff person from the university to serve as a liaison to the schools for frequent contact with the schools would have also been desirable. This is especially desirable for a program in which several schools are involved. The liaison could monitor and help correct inconsistencies from school to school, as well as monitor and correct misunderstandings about the program in individual schools. The liaison also could make suggestions about the choices of Cooperating Teachers.

A related challenge was that some of the Cooperating Teachers, who had been identified as innovative teachers who understood standards-based education, did not hold a full professional credential for their subject matter. Therefore, according to policies of CSULB, they could not serve as supervising teachers for student teaching. This disrupted the continuity of the program, and necessitated recruiting teachers who were not familiar with the program. Many of these newly recruited teachers did not understand that the Fellows had already had considerable classroom experience and started them out as if they were new to the classroom.

There was ongoing debate within the DRIAB about whether the Fellows should have been placed immediately into inner city schools. It is possible that placing them in schools with well-established reform efforts early in their program would have allowed them a more consistent experience. Whether or not they saw teaching that actively engaged the students through hands-on, inquiry-based pedagogy was sporadic at best. Many of the teachers, and indeed many of the university professors, did not exhibit this type of teaching. Although the schools recommended by LAUSD were supposed to have teachers who were engaged in the effort of the district to reform mathematics and science teaching, in fact, at many schools, there were only one or two teachers who modeled active learning. These teachers were not always available to serve as Cooperating Teachers. Moreover, according to the DRI Fellows and the external evaluator, even some of the teachers who were highly recommended by the district did not always apply the principles of inquiry-based pedagogy. On the other hand, placing the Fellows in inner city schools early allowed them to overcome fears and reservations they had about teaching in such schools.

In evaluations of the program, the Fellows expressed that one of the most valuable parts of the design of the program was the early entry into ethnically diverse inner city classrooms. This made subsequent student teaching and employment easier and encouraged them to seek teaching positions in similar schools.

Cooperating Teachers appeared to have gained benefits from participation in the program. Not only were their leadership skills enhanced, but they grew professionally from learning about industry applications and technology from the Fellows. Had they been involved more in the development in the design of this phase of the program, their insights could have proved useful.

Professional Development Activities

During the first year of full-time teaching, the DRI Fellows were concerned primarily with classroom management and just getting lessons planned and presented, an attitude that is reportedly similar to most first year teachers. Therefore, the participation in most of the professional development opportunities, except for the Saturday Seminars, was low. The attendance at the Saturday Seminars appeared to be higher mainly because of their desire to talk to one another.

Fellows were not active in recruiting other teachers from their schools to participate in the Saturday Seminars or other activities, despite repeated urging by DRI staff. When queried about this, they reported that other teachers did not want to give up their Saturdays. Moreover, the Fellows did not work hard at getting other teachers to attend because they did not want to disturb the closeness of the cohort.

The intent of the professional development activities, besides promoting a good attitude about life-long learning for teachers, was to encourage the DRI Fellows to remain in the teaching profession, in spite of overwhelming disincentives to do so. As first-year teachers, DRI Fellows reported on the overcrowded conditions of their classrooms, with over 50 students per class in some cases; lack of mentor teachers in their school or in their discipline; unfeeling and unhelpful performance reviews by administrators; lack of textbooks and other materials; and classrooms in poor condition. As new teachers, they were generally given the lowest level classes with the most unruly students and were frequently required to teach outside their field of expertise.

SECTION 4: RECOMMENDATIONS FOR FUTURE PROGRAMS AND DISCUSSION

Recommendations

- **Recommendation 1. Carefully select candidates for teacher credential programs, even if it means that the program will not be completely filled.**

In the early 1990's, professionals with degrees in engineering, mathematics, and science represented a large pool of potential teachers. However, in a subsequent (1998) privately-funded program, to be based in Long Beach Unified School District, the Urban Teacher Preparation and Professional Development Project (UTP), very few applications were received and little media attention was garnered. At that time, the economy of the area was stronger, especially in the science-, mathematics-, and engineering-based industries, such as aerospace. If a program which seeks to provide high quality teachers to urban schools is to be a service to the schools hiring those teachers, then a careful selection process must be maintained, in spite of low numbers of applicants. A successful program must include the school district in the choice of candidates and take into consideration the type of schools, such as urban schools, in which the new teachers are apt to be hired. In the case of UTP, although extensive recruiting was undertaken, there was about one-eighth the number of applicants as for the DRI and of those, very few were able to qualify for the program in the opinion of the school district officials and the UTP staff who were interviewing. During the same time frame, similar results were reported nationally for other programs.[17]

The Haberman Urban Teacher Interview appears to be an effective tool for selecting teachers in an urban setting. However, the correlation to accomplishment and retention in the classroom is not perfect, and DRIAB recommends that it not be used as the only selection device.

- **Recommendation 2. Encourage qualified candidates to enter a teaching as second career program by providing adequate financial incentive.**

The fact that DRI offered a $22,000 stipend plus tuition was a considerable incentive for many of the Fellows to enter the program, according to the DRI Fellows. However, many programs do not have a level of funding to allow for this amount of stipend. Other ways which DRIAB discussed to provide financial support for participants include soliciting corporations for sponsorship of participants and creating teaching internships in which participants are paid to teach while receiving a credential.

- **Recommendation 3. Provide early and frequent entry into the classroom for the potential teachers.**

Standard teacher credential programs offered in California are made up of an introductory course early in the curriculum which requires some observation in a classroom, followed by a series of didactic courses presented by university professors, and finally by approximately two to three months of student teaching. The student teacher usually has full responsibility for two or three classes under the supervision of an experienced fully credentialed teacher. The opportunity for the student teacher to spend an extended period of time in one classroom prior to student teaching is not consistently present in many programs. It is not surprising, then, that a significant

[17] Lawton, Millicent. "Math, Science Teaching Recruits are Elusive". In *Education Week*, July 13, 1998.

number of potential teachers never actually enter the classroom after receiving their initial credential.[18]

The DRI program sought to circumvent this waste of financial and human resources by placing the DRI Fellows into the classroom early, and continuing the field experience throughout the entire course of study. Having been in the classroom with increasing responsibilities facilitated an easier transition into student teaching for the DRI Fellows and contributed to a lower attrition rate as compared to national and California figures.[19] In addition, the careful placement of the student teacher or Fellow with a fully credentialed teacher also needs to take into account the credentialed teacher's commitment to the teaching style being sought and their enthusiasm to for the Fellow to continue learning in the classroom rather than getting free time while the student teacher takes control of the classroom.

- **Recommendation 4. Present both the recommended pedagogy and content matter together when relevant as well as in ways that model good teaching practices.**

Presenting the didactic material at times when it was relevant to the prospective teachers enhanced the learning experience for the DRI Fellows. The university professors were able to assign targeted observations and special field projects that could then be discussed in class. This type of instruction, sometime referred to as "just in time instruction", has been shown to be effective for many types of students. Engineers, who are accustomed to real-world applications, can especially benefit from having the instruction relate directly to the experiences. Not only did the university courses become more meaningful to the potential teachers, but the modularization of the courses into one-credit units allowed for mid-course correction when it was required. As the CSULB faculty received feedback from the Fellows, the Cooperating Teachers, and the external evaluator, they were able to make changes in module timing and subject matter coverage, such as adding more information on classroom management.

- **Recommendation 5. Foster a sense of professionalism and importance of career-long learning in new teachers.**

The importance of promoting a sense of professionalism in teachers, which includes career-long learning, has been stressed through many recent publications.[20] This sense of professional development was introduced early in the DRI program, before the credential program was actually completed. After providing two years of follow-up professional development activities for the Fellows, a university mathematics professor was asked to ascertain the continuing needs of the Fellows and make recommendations to them about further professional development programs.

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[18] Michael McKibbin, Report to the DRIAB on Alternative Certification, September, 1998.

[19] Moskowitz, Jay and Stephens, Maria, eds. *From Students of Teaching to Teachers of Students: Teacher Induction Around the Pacific Rim.* Published for Asia Pacific Economic Cooperation by U. S. Department of Education. 1997; Mary Jane T. Pearson and Bill Honig. *Success for Beginning Teachers.* California Department of Education, Sacramento. 1992.

[20] National Research Council. " Science Teaching Standards" *National Science Education Standards.* National Academy Press. 1996; National Commission on Teaching & America's Future. "Recommendations: An Action Agenda for Change." *What Matters Most: Teaching for America's Future.* 1996.

While it may be beyond the scope of many credential programs to maintain a follow-up program after the newly credentialed teachers begin teaching, information about, opportunities for, and encouragement toward career-long professional development should be part of any teacher preparation program.

- **Recommendation 6. Provide new teachers with a support system.**

The DRI project confirms the effectiveness of programs such as the California Beginning Teacher Support and Assessment (BTSA) program which provides funding for school districts to work with newly inducted teachers to make the first few years of teaching as smooth as possible. School districts which take advantage of the legislated $67 million show significant improvement in the retention rate of beginning teachers. Universities and school districts alike need to address how new teachers are inducted into the profession. Studies have shown that where all professionals take active roles in a new teacher's entry into the profession, success rates of new teachers are the highest.[21] Teachers with seniority feel it is their right to have the smallest, most advanced, easiest to manage classes, so new teachers get stuck with the most difficult students in large, low-level classes. This is in contrast with teacher induction in other countries as reported in studies funded by Asia Pacific Economic Cooperation (APEC).[22] In many countries, new teachers are given the easiest classes to teach, reduced teaching loads, and special, required professional development opportunities. It is entirely possible that a study of induction of new teachers with recommendations for future practice that builds upon the APEC study is a necessary next step.

Discussion

It is difficult to evaluate the effectiveness of teachers in the classroom in order determine the success or failure of a program. In the case of the DRI program, the external evaluator and DRI staff sought opinions of school site administrators and other teachers. These colleagues of the Fellows consistently rated the DRI Fellows as exhibiting good teaching ability, overall participation in school activities, and leadership capabilities.

If the majority of the DRI Fellows remain teaching in inner city schools, as appears to be the case at the writing of this report, then the DRI program can be said to have reached one of its goals albeit at a substantial funding level. If the DRI Fellows continue to explore standards-based mathematics and science teaching and to lead other teachers in their schools to do the same, as has been reported to be the case by the external evaluator, then the DRI program has accomplished another of its goals.

The most important aspect of effective teaching, whether or not the students are learning, is one of the most difficult to assess in the two and a half years that the Fellows have been teaching. This does not allow enough time to track such measurements as improvement of student scores on standardized tests. Moreover, the effectiveness of a teacher is not always marked by such improvement or non-improvement. The effect a teacher has on a student's life often does not

[21] Moskowitz, Jay and Stephens, Maria, eds. "From Students of Teaching to Teachers of Students: Teacher Induction Around the Pacific Rim". Published for Asia Pacific Economic Cooperation by U. S. Department of Education. 1997.
[22] *Ibid.*

appear until later in the life of that student. Dr. Martin Haberman, in his book *Star Teachers of Children in Poverty*[23], states that, for children in poverty, school and learning are not just necessary for earning a better living, it becomes a life and death issue. Their existence depends upon being able to break out of the life of drugs, gangs, and gang violence to which so many are exposed. Nowhere is the possibility for helping young people leave that life behind more evident than in the story of the DRI Fellow whose students call Mr. G:

> *Mr. G came to the DRI project with over twenty-five years of aerospace design engineering experience. "I grew up in the projects of Chicago," he said. "It was wonderful to have teachers who motivated me to keep out of trouble, finish high school, and go to college. I want to be able to provide that same motivation to young people who may not think it possible for them to succeed." An African-American, Mr. G chose to teach in a middle school in the troubled and challenging Compton School District. As a first year teacher, Mr. G was assigned four seventh grade mathematics classes and one science class. None of his classes had less than 45 students and he was not assigned a teacher's aide or a new-teacher mentor. His last-period science class had 56 students with less than 45 seats. His assigned classroom had temporary folding tables and chairs, insufficient lighting, no equipment or supplies, and broken windows. "When it rained [during the one of the wettest winters on record], all the kids got done was mop up the water that came in through the broken windows. I asked several times for them to be repaired, but to no avail." Mr. G developed his own unique way to maintain some semblance of order in his large classes. If a student refused to sit down or be quiet after being asked several times, Mr. G would get on his cell phone, which he carried at all times, and call the student's parent or guardian. "Of course, most of my students didn't live with both of their biological parents. Many of them lived with grandparents or were wards of the court placed in professional foster homes. These people did not like to get calls from the teacher and that served as an incentive for the students to behave." Mr. G was a vocal advocate for his students in the school and he finally ran afoul of the administration when he allowed a photographer for the Los Angeles Times to photograph the broken windows in his classroom. "At least I got the windows fixed!" he said.*
>
> *Mr. G did not return to Compton School District the following year. He began the year substitute teaching in Long Beach Unified School District. A member of the Special Forces during the Vietnam conflict, Mr. G gained a reputation early in the year as a teacher who could handle the tough students. He was asked to join the mathematics faculty at the continuation high school, a school for recalcitrant students who have not succeeded at other high schools. "My goal for my students is to help them get meaningful employment when they leave high school. Realistically, most of them will never go to college, and unless they have the skills necessary to get decent jobs in a technological world, they will be out on the streets robbing stores, doing drugs and gang-banging. Every one of my classes has all levels of abilities in it, because the students are not grouped according to their skill level in*

[23] Haberman, Martin. *Star Teachers of Children in Poverty*. Kappa Delta Press. 1996.

mathematics, but according to grade level. I have to be innovative in my approach. At any one time, I have students helping students, students who are doing individual work on computers, and students working in small groups. I require every one of my students to do a Geometry tutorial on the computer in every class, no matter what their mathematics skills. At least I can pretty much try anything I want, because all the district wants is that I keep the kids under control." Mr. G is chairman of the technology committee for his school and is determined to have one of the best computer labs in the district. "For these kids, being skilled on the computer just might save their lives. It might make the difference between being able to find a job with good pay versus hitting the streets and being shot to death." He thinks his work is important to society, and he doesn't hesitate to pitch this angle with potential donors of computer equipment, because if he and his students are successful, they won't be on the welfare rolls or in jail cells.

Mr. G is back at the continuation high school for a second year, with a new mission. "The district is establishing new mathematics standards and graduation requirements, but they don't apply to the continuation high school students. All other students must take Algebra to graduate. I want the same to apply to my students. High expectations produce high results. These kids deserve the same expectations as other students."

SECTION 5: APPENDICES

APPENDIX A

Acronym List

APEC	**Asia Pacific Economic Cooperation**
BTSA	**Beginning Teacher Support and Assessment**
CBEST	**California Basic Education Skills Test**
CLAD	**Cross-cultural, Language and Academic Development**
CSULB	**California State University Long Beach**
CTC	**California Teacher Credentialing**
DOD	**Department of Defense**
DRI	**Defense Reinvestment Initiative**
DRIAB	**Defense Reinvestment Initiative Advisory Board**
LA	**Los Angeles**
LAUSD	**Los Angeles Unified School District**
LHS	**Lawrence Hall of Science**
LLNL	**Lawrence Livermore National Laboratory**
MATCH	**Military Alternative Teacher Certification and Hiring**
NAS	**National Academy of Sciences**
NCTM	**National Council of Teachers of Mathematics**
NRC	**National Research Council**
NSF	**National Science Foundation**
NSTA	**National Science Teachers Association**
NTE	**National Teachers Examination**
PIC	**Private Industry Council**
S&E	**Science and Engineering**
SSAT	**Single Subject Assessments for Teaching**
TIMSS	**Third International Mathematics and Science Study**
UCI	**University of California at Irvine**
USI	**Urban Systemic Initiative**
UTP	**Urban Teacher Preparation and Professional Development Project**

APPENDIX B

October 1993 Feasibility Meeting Report

A Report of the Planning Meeting on October 25-26, 1993

Major issues considered:

I. Examination of existing programs
II. The recruits (potential teachers)
III. Availability of employment
IV. Credentialing

I. Elements of existing programs for certification of military and defense-related civilian personnel as Science and Mathematics Teachers

A. Existing programs represented at the planning meeting

1. *California State University, Dominguez Hills.* This is a program designed specifically to prepare former aerospace industry scientists and engineers to become teachers. We heard from those that were involved in the mathematics certification program. The program is completed in a two semester sequence. Student teachers start with a one-week period of experience to investigate whether they want to continue in the program. The program includes specialized course work, especially in classroom management, and an internship with a master teacher. Much of the course work is concurrent with the internship teaching. Thus the student teachers enter the classroom with a minimum of formal training in teaching. The master teacher is paid to work after school and weekends with the student teacher. A cohort is developed that continues throughout the life of the program. The program is supported financially by Rockwell and other companies. Rockwell pays for the tuition and fees for the student teachers. The program is designed mainly for retiring personnel. The demanding physical requirements has exceeded the stamina for some of the student teachers. The program builds in time for students to prepare for the National Teachers Examination (NTE). [Now called the Praxis examination.]

2. *California State University, San Jose and Lawrence Livermore National Laboratory (LLNL).* A program designed for LLNL career scientists/engineers/technicians, and more recently their spouses, who have at least a bachelors degree. In order to be admitted into the program officially the student teacher must pass the California Basic Educational Skills Test (CBEST) and the NTE. The program consists of four courses and classroom experience. In the first semester student teachers are required to spend one hour per day observing both high school and middle school classes. There are three semesters of student teaching. The sites are chosen by the student teacher, but approved by the program. Since the LLNL employees continue to work for LLNL, courses are conducted in the evening. However, the work schedule is made flexible to accommodate the student teaching component of the program. Tuition is paid by LLNL. The result is a single subject teaching credential for either mathematics or physical science.

3. *California State University, Long Beach.* The initial exploratory phase is important. The main participants are mid-career switchers or women returning to work. Evening sessions are held to accommodate participants who are still working.

4. *Harvard Graduate School of Education.* This is a mid-career program that consists of one year of full-time enrollment, plus a required 4-week course of study, workshops and observation during the summer preceding the fall term. The program leads to a Masters in Education degree or a certificate of Advanced Study. Financial aid is needs based in the form of grants and loans. About 80 percent of students receive aid. There is a special grant for minorities.

B. Information about other existing programs.

1. *Marymount University, Virginia.* A master's degree program has been established for active duty personnel and their dependents, DOD civilians at the Naval Military Personnel Command and their dependents and retired military/DOD personnel. A BA/BS degree in a content area is required. The master's degree program is a 39 credit NK-8 Master's and Certification program or a 21 credit Secondary Certification Program with 15 additional credits for M.Ed. The program is held at the Navy Annex.

2. *California State University, San Francisco.* ENCORE/Military Mid-Career Teacher Training Program is partially funded by the DOEd. The program is 18 months in duration and carries a $2500 stipend. It includes a cohort support system and makes use of the California Mentor Teacher Program. Mentor teachers are compensated. The program includes student teaching and one year of full-time teaching in San Francisco Unified School District. New teachers are linked to the California New Teacher Project. A unique aspect of the program is its candidate resource team: a university teacher educator, an on-site mentor teacher, a program coordinator, content area specialists, a district credentialing counselor and an on-site school administrator. The team meets in a seminar format with the cohort. A preparation course for the NTE is provided.

3. *Mills College and Lawrence Hall of Science (LHS).* This is a mid-career switch program that emphasizes special topics having fundamental significance in the discipline, the integration of concepts within and across fields, and hands-on interactive teaching strategies. The goal is to prepare teachers to work in inner city classrooms. It is a cooperative effort among Education, Physical Science, Biology and Mathematics Departments of Mills College, LHS and Oakland Unified School District. It is supported by corporate donations. According to their brochure, 25 percent of their newly trained teachers are taking part in district leadership roles after the first year of teaching. The program is starting a Leadership Institute for Teaching Science (LITES).

4. *Sacramento County Public School Consortium M.A.T.C.H. Program (Military Alternative Teacher Certification and Hiring).* This is a district internship program which is comprised of a 30-month professional development teacher preparation plan. It includes a six-month intensive preservice course and practicum with a subsequent paid teaching assignment (internship) supported by mentor teachers (K-12). There are afternoon and evening classes: one class per week for two years. There are afternoon and evening class: one class per week for two years. At the completion of the program the candidates are eligible for a clear credential. The classes are

taught by resource teachers, administrators, and other curriculum experts from the participating districts and the Sacramento County Office of Education. The candidates must have passed CBEST and NTE. Tutoring is available for these tests, and a teaching assignment (internship) is guaranteed.

II. The recruits (potential teachers)

As noted in the above descriptions, most of the programs currently offered focus on preparing retiring S&E personnel to become mathematics and science teachers. Another group is military personnel in their mid to late 40s, who are retiring with pensions. Those two groups were considered to be a "special" group because of their relative financial security due to pensions or social security.

The group devoted some of its deliberations to the issue of S&E personnel who are not at retirement age, who are still young and do not have pensions to fall back on, and who must look for new careers due to downsizing. Some options for addressing those issues are found in the proposal.

III. Employment availability

In the California Assembly Bill #1161, introduced in March 1993, the state legislature found that California has a serious shortage of qualified teachers in the subjects of mathematics, science, and technology, teachers who work with limited-English-proficient pupils, and teachers of minority teachers.

According to the Los Angeles Unified School District (LAUSD) representatives at the meeting, there is a need for physical science and mathematics secondary teachers and for elementary teachers who are comfortable teaching science. Moreover, bi-lingual mathematics and science teachers are greatly needed. Life science teachers (who are not as likely to be recruited by this program) are not in short supply.

According to one LAUSD representative, LAUSD had a shortfall of about 600 teachers at the start of the 1993 school year. At least 50 or 60 of those were in the area of science.

IV. Credentialing

The traditional credentialing process for teachers in California is one where the candidates are students in a fifth-year program and receive college credit for their supervised teaching as well as for coursework in the basic principles of education and methods courses. In order to obtain the *Professional Clear Teaching Credential* the following must be completed: one year of postgraduate study, a course on the U.S. Constitution; supervised teaching; and professional courses, including reading instruction, health education, special education and computer education. The credential lasts for five years, and is renewable.

With a *University Internship Credential*, the intern teachers provide instructional services while they complete required courses in educational principles and methods. During their preparation, intern teachers provide instructional services earlier than other credential candidates, and they do so without being directly supervised by a certified teacher. For this reason the state requires interns to fulfill higher standards of admission to preparation programs than other candidates. Intern credentials last for two years during which the candidate must complete professional courses, including reading, health education, special education and computer education. After completion of the courses, the candidate is eligible for a Professional Clear Teaching Credential.

The *district intern certificate* allows a school district to create a professional-development plan for its own student teachers, although districts are required to provide interns with the support of mentor teachers and the program must last a minimum of two years. Evaluation of student teachers' performances by the employing district is the primary standard for qualifying for Professional Clear Teaching Credentials. District interns are not required to meet the same statutory requirements (health education, special education, and computer education) as other applicants for Clear Teaching Credentials. Districts that choose to offer programs must file a statement of need and certify that they will supply the required training, support, and evaluation.

California laws originally authorized the State Board of Education to waive, at the request of a local school district, one or more state credentialing requirements that are administered by the Commission on Teacher Credentialing. Shortages of individuals with essential qualifications are the primary reasons for waivers of certification requirements. Each waiver is for a limited term. Recently the authority to waive the credentialing requirements has transferred to the Commission on Teacher Credentialing. The Commission is committed to developing more teachers rather than granting waivers.

APPENDIX C

List of Participating Los Angeles Unified School District DRI Schools

Bell High School
4328 Bell Avenue
Bell, CA 90201

Berendo Middle School
1157 South Berendo
Los Angeles, CA 90006

Jefferson High School
1319 East 41st Street
Los Angeles, CA 90011

John Marshall High School
3939 Tracy Street
Los Angeles, CA 90027

Nimitz Middle School
6021 Carmelita
Huntington Park, CA

South Gate High School
3351 Firestone Blvd.
South Gate, CA 90280

South Gate Middle School
4100 Firestone Blvd.
South Gate, CA 90280

George Washington Prep High School
10860 South Denker Avenue
Los Angeles, CA 90047

APPENDIX D

External Evaluator's Final Report

External Evaluation of the Defense Reinvestment Initiative Project

Final Report
1994 - 1998

Submitted to:

Center for Science, Mathematics, and Engineering Education
National Research Council

Submitted by:

Glenn F. Nyre, Ph.D.
Evaluation Consultant

December 31, 1998

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PREFACE

Because I had the privilege of serving as the external evaluator during the entire four years of the Defense Reinvestment Initiative, the evaluation process has benefitted from a continuity of approaches, an understanding of programmatic nuances, and the ability to obtain the trust of the DRI fellows and their colleagues in the schools where they observed, participated in cooperative teaching, student taught, and were eventually full-fledged teachers themselves.

Throughout this time, the evaluation benefitted from the efforts of many others. The thorough and impeccable records maintained by the DRI program office, the willingness of CSULB project director and the mathematics and education professors to discuss issues with me, and the teachers and administrators at the schools who spoke with me during my many site visits to their campuses made my job both easier and enjoyable. In addition, the DRI Advisory Board provided valuable guidance and feedback regarding the evaluation activities and findings, and were responsive to recommendations that were included in each of the four annual evaluation reports. The DRI program director and I maintained in close communication throughout the program. She kept me fully informed of the status of the fellows and any programmatic changes, and could not have been more supportive of and responsive to the evaluation component of the program.

The fellows gave a great deal of their time and effort to the evaluation, enduring multiple interviews, classroom observations, surveys and telephone calls. Viewing me from the beginning, in their engineering language, as "the quality control guy," their cooperation was invaluable to my work. I am indebted to them, and wish them well in their new careers.

Glenn F. Nyre, Ph. D.

EVALUATION STRATEGIES

During the four years of the DRI program, the following evaluation activities were undertaken:

- Both formal and informal contact and reporting was maintained with the DRI Program Office on a routine basis throughout the program.
- All program documents were routinely reviewed, from the minutes of organizational meetings and applications for participation in the program through the status of the fellows' attainment of teaching certification requirements, employment status, and participation in the follow-on support components of the program after the formal thirteen-week training program had been completed.
- Fellows were formally interviewed twice every year.
- Fellows were asked to complete a survey every year.
- Informal contact was maintained with the fellows by means of telephone and e-mail conversations.
- Fellows were observed in classrooms settings at least once every year, including their observation, cooperative teaching and student teaching phases, as well as after they became full-fledged teachers themselves.
- The fellows' teaching and administrative colleagues were interviewed during each school site visit.
- Both formal and informal contact was maintained with the CSULB project administrator during the initial two years of the program.
- CSULB mathematics and education faculty involved with the program were interviewed during the initial two years of the program.
- Oral evaluation briefings were given at all DRI Advisory Board meetings.
- Four annual written evaluation reports were submitted, as well as this final report.

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EVALUATION FINDINGS

Quantitative Outcomes

Completion Rate

Twelve of the 15 fellows who began the program completed it (80%) -- an outstanding completion rate when compared against both traditional and alternative teacher preparation programs. Of the non-completers, one had health problems that precluded his continuance; one received several negative reviews from schools to which he was assigned during the classroom observation and cooperative teaching phases of the program, and was asked to leave; and one left voluntarily after experiencing repeated difficulties dealing with what some might call the "second-class status" of being a student again after having held an executive-level position in private industry.

Placement Rate

***All 12* of the DRI fellows who completed the program were teaching in the semester immediately following program completion.** Ten had full-time mathematics or science positions; one was substituting as a mathematics teacher; and one was teaching non-science/mathematics subjects in an adult school program.

Retention Rate

The National Center for Educational Statistics reports that 22 percent of teachers leave their jobs within the first three years. This percentage is greater in urban areas, where the attrition rate approaches 50 percent in five years. As they entered their third year of teaching in the fall of 1998, **only two of the 12 DRI fellows had left the field -- an 83 percent retention rate**. One of those 12 is currently on hiatus from teaching due to a medical emergency, but plans to return when his health improves.

As the fall 1998 semester progressed, a third fellow was experiencing a great deal of stress from the large middle school mathematics classes that he was teaching. He had experienced problems with classroom management throughout the DRI program, and had attempted to deal with this situation by taking two courses and attending workshops on the topic. However, he decided that his health was suffering too much and that he would probably be better suited to teaching at the adult school level. Although the urban schools that were to be the beneficiaries of the program have lost him, the profession has not. I therefore do not consider him to be an unsuccessful participant in the program, but rather, a "diverted success."

The two fellows who left teaching after having been successfully placed in schools both returned to private industry -- one after not having her teaching contract renewed, and one for personal reasons. Both remain very positive about their DRI experience. The former is very grateful to the DRI program for renewing the confidence and discipline she thought she had lost in the intervening years since her previous college experiences. One of the comments from that fellow was: *"I think it takes a special 'gene' to be a teacher, and I just didn't have it and couldn't develop it."*

That fellow had inadequate support from the principal of the school, her assigned mentor teacher taught English at another school in the district, and the mathematics department held no formal meetings -- basically leaving her "alone" during her first year of teaching. She was employed in a district well beyond the boundaries of the one with which DRI had a formal relationship, and the program had little recourse to intervene on her behalf. The second fellow who left maintains his relationships with several other DRI fellows strongly asserts that he will return to teaching when it again becomes a feasible option for him, given personal considerations.

Qualitative Outcomes

Completion and Retention

The fellows were asked to provide their own opinions as to why the DRI completion and retention rates have been so positive. Their most frequent answers were as follows:

- Support from the DRI Program Office;
- Their gradual immersion into teaching through the sequential observation, cooperative teaching, and student teaching phases; and
- Their early and continuous exposure to the types of schools in which they would eventually work, and to the types of students they would be teaching.

The Standards

It is important to the DRI program that the fellows are aware of, use, and advocate the national standards in mathematics and science. All of them report using the standards, but to somewhat varying degrees depending upon circumstances in their school or district. As one said, "When the department chair hands you a book and says 'cover these chapters this semester and those chapters next semester,' you must be creative to make sure you integrate the content and teaching techniques required by the standards."

Most of the DRI fellows are not only basing the majority of their preparation, delivery and assessment practices on the standards, but many are encouraging other teachers to do so as well. Although some were hired by schools in which new curricula was not in place and new teaching methods were not

evident, as these materials and concepts are increasingly introduced, the fellows are more receptive than many other teachers and champion the cause. Most are supplementing old textbooks by bringing in newer materials on their own, and sharing them with other teachers as well. There is a good flow of pedagogical, content and student exercise and activity information and materials among the fellows themselves.

As reported in the 1995 Annual Evaluation Report, based on interviews and a survey as the fellows had just completed their first summer session and were two months into the fall semester of their thirteen-month formal training program, they "only moderately endorse reform learning, and are not confident that they understand how to carry it out." That same report found that 40 percent of the fellows "have negative attitudes about the teaching methods endorsed by state and national reform standards," and also commented on their "cynicism" and "decreasing enthusiasm" for reform methods. To use the vernacular, the fellows "didn't get it," didn't think they ever would, and weren't sure it was worth "getting." Major strides were obviously made in this regard in the subsequent two years, as the fellows have now become "champions" of the cause. This was a result of increased classroom exposure and experience, coupled with the additional learning and information exchanges facilitated by the "Saturday Session" seminars and other follow-on activities provided by the program.

Program Ratings

At certain stages of the program, the fellows were asked to rate various components of the DRI program in terms of their perceived value of each. Their responses have been included in previous annual reports, and the most notable finding across the years is that the longer they were in the program, and especially after they became teachers themselves, the less they valued all aspects of the program that were connected to the college -- education classes and student teaching observations and feedback from CSULB education professors. On the other hand, the school-based activities, support from the DRI Program Office and the professional development aspects of the program (i.e., "Saturday Seminars", professional memberships, attendance at conferences, etc.) were highly valued.

Future Plans

In the fall of 1998, the fellows were asked about their plans to remain in teaching, and their responses were compared to those of a national sample of traditionally credentialed (TC) and alternatively credentialed (AC) teachers. ***All* of the DRI fellows said that they plan to remain in the field for the rest of their career**, whereas only 60 percent and 57 percent of the national sample of TC and AC teachers, respectively, gave that response. By contrast, fourteen percent of both comparison groups held out the possibility that they might leave teaching "if something better comes along;" four percent of both the TC and AC teachers said they "intend to leave as soon as I can," and 22 percent of the TC and 26 percent of the AC teachers in the national sample were undecided about their future in relation to a teaching career.[1]

[1]Shen, Jainping. *Has the Alternative Certification Policy Materialized Its Promise? A Comparison Between Traditionally and Alternatively Certified Teachers in Public Schools.* Educational Evaluation and Policy Analysis, vol. 19, no. 3, Fall 1997.

Hindsight

Near the end of the four years, the fellows were asked the following question: "*Knowing what you know now, if you could go back to your college days and start over again, would you chose to become a teacher?*" **All but one said either "absolutely yes" or "yes."** The remaining one selected the option "possibly," and subsequently opted to teach in an environment other than the middle and high school level. None gave a response of "no" or "absolutely not."

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OBSERVATIONS AND REFLECTIONS

By the fall of 1998, it was obvious that the fellows, as a group, had "blossomed" as teachers and leaders within their schools. It had become a pleasure to observe them (which was not always the case previously), as they became much more self-assured and in control of their classrooms. They were also using a broader base of materials and student activities in their instruction, and those who have teaching assistants were using them more effectively.

The evaluation site visits became increasingly like professional exchanges, as we talked about things such as pedagogy, new curricular materials they were introducing, additional small group activities they were implementing, and field trips they were arranging. Previously compelling concerns about classroom management, lesson plan preparations, and grading student homework were rarely raised.

The fellows have also gained seniority and are exerting more influence within their departments. As one of them joyously said, *"They actually gave me a choice of what courses and grade level I would like to teach this year!"* Another is developing his school's first honors science course. With only a couple of exceptions, the fellows are moving into leadership roles not only within their departments, but within their schools at large. Three are doing volunteer mathematics tutoring, and two are chairing school-wide committees.

Some fellows are showing advanced aspects of leadership – introducing colleagues to new textbooks, materials and instructional strategies; had brought them along to DRI "Saturday Sessions;" and are encouraging them to accompany them to off-site subject matter and pedagogical meetings. Most are contributing personal resources to their classrooms, including manipulatives and software, as well as bringing in their own computers, modems, scanners, televisions, videotape machines, telescopes, etc.

Some fellows are in schools that have excellent support systems for innovative instruction. One is in a school that divides instructional time into three distinct block-class periods per day, with each consisting of almost two hours, thus allowing him more time for hands-on activities; one is teaching in a school in which he spent much of his DRI training time, and, according to his department chair, was viewed as a "fixture" in the mathematics department for more than a year before being hired; four others are enjoying teaching integrated mathematics classes; one was asked by a special magnet program in his school to develop and teach their specially-focused mathematics course; and another is in a school that provides stipends for participation in four-week summer courses for curriculum and professional development.

Principals, department chairs and fellow teachers have pointed out that new teachers who have been through more traditional preparation programs typically have more problems dealing with the "routine" of schooling, interacting with today's multicultural and multi-talented students, and becoming active participants in the school and surrounding community.

Because of the opportunities awarded them through the Defense Reinvestment Program, all appearances are that public schools in the greater Los Angeles area will continue to benefit from the

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fellows' DRI experiences for some time to come.

CRITICAL PROGRAM ELEMENTS

The many positive program outcomes detailed above are testimony to the overall success of the program and point to several of its components that contributed the most to them. For example:

- The early classroom observation phase was invaluable in introducing the fellows to the types of settings in which they would eventually work and the variety of youth with whom they would be interacting.
- The cooperative instruction phase was one of the more innovative aspects of the program, and critical in easing the fellows into the practice of teaching under the guidance of a seasoned teacher.
- The two-year follow-up phase after the formal pilot program was completed facilitated the fellows' transition from learner to teacher, and helped several of them succeed in environments where resources were inadequate and faculty in their field were not using standards and reform methods of instruction.
- The DRI Program Office was viewed by the fellows as one of the most important elements of the program, bringing general program advocacy, "troubleshooting," and individual support to bear as needed. As one of the fellows said in a group interview, with the others concurring, "Dr. Shiflett was the glue that held this program together administratively – and some of us psychologically."

RECOMMENDATIONS

If subsequent programs based upon the DRI pilot model are implemented, the following recommendations should prove helpful in ensuring their success:

1. Unless the program is large enough to provide adequate coverage in more than one content area, it should focus on only one.

2. Given the tremendous anxiety created among the fellows, and the hurdles that were encountered by the need to pass subject matter examinations in order to obtain a full credential, consideration should be given to enacting at least one of the following suggestions to mitigate this problem:

   - Applicants should provide evidence of passing any tests required for this purpose in advance;
   - Applicants should be required to take a "predictive" test to determine their knowledge of the subject as it is currently being taught and/or will be presented in such examinations;
   - Applicants should be required to take a diagnostic test so that targeting tutoring can be provided to meet their needs; and/or
   - General subject-matter tutoring and specialized coaching should be a built-in component of the program.

3. The full cooperation and support of the school district in which the program is operating should be obtained, and any specific support required of certain positions within the district should be detailed and agreed to in writing prior to the commencement of program operations.

4. The selection of school sites and teachers to work with the program should be made a high priority, and the selection of each should be presented as an honor. Requirements in this regard should include the following:

   - The school, or at least the participating department, should provide evidence of its understanding of and commitment to the practice of reform-based instruction and assessment; and
   - Teacher interest in and ability to constructively work with program fellows should be evidenced by a written application to participate in the program, and an agreement to welcome

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observation of their instruction by program personnel prior to their possible selection.

5. The district, the schools, and the teachers should be engaged and treated as program partners, with the teachers being provided with opportunities to participate in special, out-of-school professional development activities with the fellows.

6. Partner expectations, roles and responsibilities should be detailed, and lines and methods of communication spelled out and agreed to prior to the fellows' initial visits to the schools.

7. College personnel involved with the program should maintain a close working relationship with school personnel, and visit the schools and classrooms throughout the observation and cooperative teaching phases of the program, in addition to the student teaching phase.

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APPENDIX E

Membership of the Defense Reinvestment Initiative Advisory Board

Frederick H. Shair, CHAIR
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, CA

Harry B. Gray, VICE CHAIR
NAS
California Institute of Technology
Pasadena, CA

Michael Acosta ♦
Los Angeles Unified School District
Los Angeles, CA

Lew Allen □
NAE
Charles Stark Draper Laboratory (retired)
Pasadena, CA

Claudia Jane Barner
Pasadena City College
Altadena, CA

Peter Cannon
VRE Company
Ventura, CA

Janet English ♦
Serrano Intermediate School
Lake Forest, CA

Larry Espinoza
Santa Ana High School
Santa Ana, CA

Laurie A. Fathe
Los Angeles Collaborative for Teacher Excellence (LACTE)
Occidental College
Los Angeles, CA

Day Higuchi □
United Teachers of Los Angeles
Los Angeles, CA

Donald Ingwerson ♦
Los Angeles County Office of Education
Downey, CA

Paul J. Kuerbis
The Colorado College
Colorado Springs, CO

David Landsverk ♦
Berendo Middle School
Los Angeles, CA

Amelia McKenna □
Los Angeles Unified School District
Los Angeles, CA

Michael D. McKibbin
California Commission on Teacher Credentialing
Sacramento, CA

Judith Mumme □
California Alliance for Mathematics and Science (CAMS)
Camarillo, CA

Jack Price
California State Polytechnic University
Pomona, CA

Ernie Roy, Jr.
King/Drew Medical Magnet High School
Los Angeles, CA

Jeffrey N. Rudolph
California Science Center
Los Angeles, CA

Ronald J. Stern
University of California
Irvine, CA

Richard Thompson ♦
NAS
University of Southern California
Los Angeles, CA

Dan B. Walker
San Jose State University
San Jose, CA

Phil Williams (retired) □
The Times Mirror Company
Los Angeles, CA

□ Membership term - 11/16/94-12/31/97
♦ Membership term - 1/1/98-12/31/98

APPENDIX F

News Releases and Select Press Coverage

National Research Council
Defense Reinvestment Initiative: Scientists to Teachers Project

Fact Sheet

Summary:	The Defense Reinvestment Initiative: Scientists to Teachers Project is a pilot program in the Los Angeles Unified School District for the transition of science and engineering professionals into careers as middle and high school science and mathematics teachers in inner-city schools.
Funding Agency:	U.S. Department of Defense
Funding Level:	$5 million over five years
Critical Players:	National Research Council Los Angeles Unified School District California State University, Long Beach
Retraining Begins:	Summer 1995
Size of First Class:	20 teaching fellows
Program Eligibility:	Military science and engineering personnel or civilian scientists and engineers in national laboratories, defense-related, and aerospace industries who have a desire to start new careers in science and mathematics teaching.
Project Site:	The site of the pilot program is the Los Angeles Unified School District (LAUSD) with emphasis on inner-city schools. Los Angeles was selected because of its diverse student population and its proximity to military and industrial sites whose work force needs are changing. LAUSD is the second largest school district in the nation, representing 28 cities in Los Angeles County. Based on 1991-92 figures, 12.5 percent of all students in California public elementary and secondary schools attended schools in LAUSD. Of those, 65.1 percent were Hispanic, 14.6 percent were African-American, and 7.7 percent were members of other ethnic minority groups.
Anticipated Results:	It is anticipated that the program will produce a cadre of successful teachers and leaders in the Los Angeles schools. These future teachers will work with master teachers to model the kind of teaching that exemplifies standards-based teaching in science and mathematics. Through a carefully-crafted, reform-minded program, these teachers will lead the way toward lasting school reform.

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NEWS
NATIONAL RESEARCH COUNCIL
NATIONAL ACADEMY OF SCIENCES NATIONAL ACADEMY OF ENGINEERING INSTITUTE OF MEDICINE
Office of News and Public Information · 2101 Constitution Avenue, N.W., Washington, D.C. 20418 · (202) 334-2138

Date: July 5, 1995
Contacts: Maureen Shiflett, Director,
Defense Reinvestment Initiative
(714) 721-2232
Cheryl Greenhouse, Media Relations Associate
(202) 334-2138, Internet <news@nas.edu>

FOR IMMEDIATE RELEASE

16 FORMER DEFENSE INDUSTRY EMPLOYEES NAMED AS TEACHING FELLOWS IN RETRAINING PROGRAM

LOS ANGELES -- Sixteen former defense industry professionals have been selected to participate in the first class of the Defense Reinvestment Initiative (DRI), a retraining program to help highly trained scientists and engineers make the transition to successful careers as math and science teachers.

DRI is a five-year pilot program of the National Research Council and the Los Angeles Unified School District, supported by a grant from the U.S. Department of Defense.

Instruction for the first class of "teaching fellows" begins July 10 on the campus of California State University, Long Beach. After completing 13 months of training, the fellows are expected to begin teaching full time in the fall of 1996 at inner-city secondary schools in Los Angeles. This area was selected because of the diversity of its student population and its proximity to military and industrial sites currently being downsized.

"Our intention is to create a model program for teacher preparation that is based on outstanding examples of science and math teaching," said DRI director Maureen Shiflett.

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The 16 DRI fellows were selected from a candidate pool of 65 applicants. Their average age is 49. Twelve of the fellows hold engineering degrees (electrical, mechanical, chemical, or aerospace engineering). The remaining fellows hold degrees in mathematics, physics, economics, or computer science. A roster is below.

The fellows will be honored at a reception on July 14 at the Arnold and Mabel Beckman Center of the National Academies of Sciences and Engineering in Irvine, Calif.

The Los Angeles Unified School District is the second largest school district in the nation, representing 28 cities in Los Angeles County. Based on 1991-92 figures, 12.5 percent of all students in California public elementary and secondary schools attended schools in the Los Angeles district.

The National Research Council is the principal operating agency of the National Academy of Sciences and the National Academy of Engineering. It is a private, non-profit institution that provides science and technology advice under a congressional charter.

# # #

[Internet availability: This news release is available on the WorldWide Web at <http://www.nas.edu>; via Gopher at <gopher.nas.edu>; and via FTP at <ftp.nas.edu/pub/>]

lf: a1, f, h, k

1995 DEFENSE REINVESTMENT INITIATIVE FELLOWS

NAME	CITY OF RESIDENCE
Arnel Abad	Garden Grove, Calif.
Angel Golan	Fountain Valley, Calif.

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Peter Goudeaux	Wilmington, Calif.
David Hasheminejad	Westminster, Calif.
Brian Jerrems	Van Nuys, Calif.
Karl H. Kastan	La Canada, Calif.
David R. Landsverk	Los Angeles
Nicholas Layana	Fullerton, Calif.
Dennis Mears	Irvine, Calif.
Lawrence B. Molnar	Yucaipa, Calif.
Bennie Murray	Los Angeles
Percy Pinto	South Gate, Calif.
Joseph Poodiack	Los Angeles
Irene Preston	San Dimas, Calif.
William Speight	Lynchburg, Va.
Diego Zamora	Long Beach, Calif.

PUBLICITY ABOUT THE DRI PROJECT*

12/21/94 "Idled Scientists, Engineers to Be Retrained as Teachers" by Amy Pyle, Times Education Writer. *Los Angeles Times*
12/22/94 "Aerospace Workers to Become Teachers" by Susan Pack, Staff Writer *Long Beach Press-Telegram*
1/2/95 "Defense Department Funds Five-year Retraining Program" *Chemical and Engineering News*
1/16/95 "Engineers Recruited as L. A. Teachers" by Robert Bellinger, *Electronic Engineering Times*
1/18/95 "Putting People to Work: Calif. Trains Idle Professionals" *Daily Report Card*
1/23/95 "Uncle Sam Wants You to Teach" *The Scientist*
1/27/95 "Pentagon, Academy Join Forces on Education" *Science*
2/10/95 "Retraining from Defense to Education" *Mathematics and Technology Magazine*
2/26/95 "Scientists to Teachers" a radio interview with DRIAB member Amelia McKenna and DRI Director Maureen Shiflett on *Points of Light*, KTWV Radio, Los Angeles
5/95 "Out of the Lab and Into the Classroom" by Erik Kreifeldt, *Optics and Photonics*
7/25/95 "Aerospace Workers Landing New Careers" by Diane Seo, Times Staff Writer, *Los Angeles Times*
8/20/95 "A Retraining Program That Adds Up" Editorial in Orange County Perspective, *Los Angeles Times*
11/17/95 "Retraining Program Turns Displaced Scientists and Engineers Into Teachers" by Steve Blazak, UTLA Communications Specialist, *United Teacher*
12/95 "Turning Engineers into High School Teachers" by Rachel A. Schwartz, *ASEE Prism*
1/96 "Program Aims to Transform Sward Makers into Teachers" by Maureen Shiflett, *National Defense*
7/96 "Teachers at Heart" by Samuel C. Florman, *Technology Review*

*A list of known publicity about the DRI project

Idled Scientists, Engineers to Be Retrained as Teachers
Education: U.S. to announce $5-million program for laid-off personnel. They would give math and science lessons in inner-city schools.
Los Angeles Times - WEDNESDAY December 21, 1994
By: AMY PYLE; TIMES EDUCATION WRITER
Edition: Home Edition Section: Metro Page: 1 Pt. B Col. 5

In a program conceived as a national model, the U.S. Department of Defense will announce today a new $5-million program to retrain laid-off scientists and engineers for teaching careers in Los Angeles' inner-city high schools.

The first 20 "teaching fellows" will be selected in the coming months and by summer should begin their studies--a specially tailored combination of classwork out of Cal State Long Beach and hands-on experience with mentor teachers in Los Angeles Unified School District. The trainees are expected to earn full credentials in time to start working as teachers in the fall of 1996.

Although some displaced defense industry workers have turned to teaching, occasionally supported by grants and programs, this is the largest commitment to date of government funding aimed at retraining for teaching careers in a specific district.

Organizers hope that the Scientists to Teachers Project will provide the seed for widespread improvement of math and science instruction in Los Angeles' public schools.

"This is a lot more important than just producing some more teachers," said Bruce M. Alberts, chairman of the National Research Council, a private nonprofit organization that will coordinate the program. "We hope (the fellows) will become leaders and advocates for science and math reform."

Los Angeles was selected for the project because of its ready supply of laid-off aerospace, defense industry and military workers, because of the diversity of its student population and because the dearth of math and science teachers virtually ensures employment, Alberts said.

The project will cover all educational costs for the fellows and pay a $22,000 stipend during the instruction period. There is no requirement that the new teachers remain in the inner city. But the program will provide professional development and mentor activities for two additional years for those who stay.

Although Cal State Long Beach will be the site of the first year's program, it may spread to other colleges and universities next year, when another 40 fellows are expected to be accepted.

Los Angeles Unified administrators greeted the project with enthusiasm and applauded the decision to focus on inner-city schools, where they find it especially difficult to recruit and retain well-qualified teachers.

"One of the major obstacles that we have is that there are not enough trained teachers in mathematics and sciences," said Assistant Supt. Amelia McKenna. "Any avenue that will help us bring to the district people with this expertise is very attractive to us."

Although strong in their knowledge of science and math, what the former professionals may lack is the ability to work well with teenagers, McKenna said. To address that, project coordinators said they will look closely for applicants with attributes that might help the fellows thrive in public schools.

"Unquestionably they are very capable people, but they are not accustomed to the behavior of 10th-graders," said Bob DeVries, director of a similar program at Cal State Dominguez Hills.

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DeVries' program began with financial support from four defense firms but is now funded through the Department of Labor as one of several options offered laid-off aerospace workers. Another national program, Troops to Teachers, focuses on getting retired military personnel into classrooms. Yet another provides educational support for ex-employees of the Lawrence Livermore Laboratories in Northern California who want to teach.

Harry Gray, a Caltech chemistry professor and chairman of the Scientists to Teachers advisory board, said the Los Angeles project should be viewed as an experiment, not a well-researched solution.

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THE PROFESSION

Engineers recruited as L.A. teachers

By Robert Bellinger

Irvine, Calif. — Under a $5 million Defense Department program, 20 laid-off defense and aerospace scientists and engineers will be retrained to teach math and science at inner-city schools in the Los Angeles area.

"They could bring so much reality into the classroom," said director Maureen Shiflett of the industry engineers and scientists. "If they're teaching algebra, they'd be able to tell middle school and high school students, 'this is how we used it,' " said Shiflett, who heads education programs in the West for the National Research Council, a private, nonprofit arm of the National Academy of Sciences and the National Academy of Engineering.

The pilot program has two aims: to tap the talents of engineers and scientists furloughed from contractors, government labs and aerospace firms in Southern California; and to fill "a crying need" for math and science teachers in the Los Angeles Unified School District.

"There are plenty of openings," said Shiflett. The school district estimates it has 60 to 70 positions in middle and high schools. Responding to criticism that retraining programs in the past haven't led to jobs, Shiflett said, "We can't offer an absolute guarantee, but the jobs are there. But candidates must be willing to teach where the jobs are."

Inner-city school

That means working in inner-city metropolitan Los Angeles schools—no easy job, Shiflett acknowledged. Moreover, teaching pays $35,000 to $40,000 a year, vs. the $50,000 to $70,000 or more that experienced engineers earn in industry. It requires disciplining kids and retaining control of a classroom. Newcomers tend to feel isolated, and lack seniority. Not surprisingly, there's a high attrition rate among those who enter teaching as a second career, Shiflett admitted.

That's why the NRC program is offering support for the 20 "teaching fellows" who will emerge from a one-year training program at California State University, Long Beach. They will receive stipends, and be mentored by experienced teachers who have learned how to deal with inner-city classrooms.

The experienced teachers, said Shiflett, also know how to cope with security issues. "Those who are successful feel reasonably secure in the schools. I don't believe teachers feel terribly threatened by that environment," she said. She added that the NRC is working with the school district's union to ensure a smooth entry for the new teachers.

Acknowledging that the pay won't make anyone rich, Shiflett stressed the uncompensated rewards of teaching. "It's nice to know you're needed—that there's a need to break the cycle of poverty."

The industry-bred teachers will be "promoting science and math literacy," she said. Added Sidney Thompson, superintendent of the Los Angeles Unified School District, "We believe that science and mathematics teachers ... can positively influence minority students to pursue careers in science, mathematics and engineering."

A $5 million program hopes to attract laid-off engineers and scientists to inner-city schools.

Successful candidates need to be flexible and to like working with kids, and must have "strong personalities," said Shiflett. The panel evaluating candidates will seek out people who are willing to stay with teaching—and the Los Angeles Unified School District.

Southern California residents will be given first priority, but others willing to relocate also will be considered. The training for certification begins this summer and lasts until the summer of '96. Graduates would start their jobs in the fall of 1996.

While the program is limited to the Los Angeles area at present, Shiflett hopes it will spread.

Anyone interested in the positions can write Dr. Maureen Shiflett at the National Research Council, Beckman Center, 100 Academy Dr., Irvine, Calif., 92715.

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January 16, 1995 Electronic Engineering Times **57**

10 SUNDAY, AUGUST 20, 1995 /R

LOS ANGELES TIMES

Orange County Perspective

A Retraining Program That Adds Up

■ Turning Displaced Defense Workers Into Math and Science Teachers Benefits Everyone

The end of the Cold War brought many blessings. The specter of nuclear war diminished. Spending on guns, missiles and warships was reduced.

But there was an unfortunate side effect as well: Tens of thousands of men and women in the defense industry, military and civilian, lost jobs. Many in their 40s and 50s were thrown out on the street, having done only one kind of work in their lives, jobs for which there was now little demand.

The U.S. Defense Department has tried to help retrain some workers, as it should. One promising new program is trying to turn 15 scientists and engineers, five of them from Orange County, into math and science teachers.

The National Research Council, a branch of the National Academies of Sciences and Engineering, began the retraining program with a Defense Department grant. The director of the program at the council's Irvine office correctly noted that the laid-off engineers bring valuable resources to the public schools because they are computer-literate, are motivated and can supply good career advice.

Trainee Ernesto Golan of Fountain Valley said the program gives him the chance to do something rewarding at age 50. He also said that after being told he was not needed in aerospace after years of work, "it's nice to be doing something where they say, 'Hey, you're needed.'"

The 13 months of training began last month with the former aerospace workers attending classes at Cal State Long Beach. They will intern later at inner-city schools in Los Angeles. Although the Los Angeles Unified School District is a partner in the program, participants are not required to work for that district after their training. Once they receive their credentials, they can go elsewhere; all are required to find their own jobs.

Math and science teachers long have been in demand in schools, and program officials do not expect anyone to have trouble finding employment in their new careers. One high school principal said the teachers are in demand because many others who could teach math and science end up doing other things.

It is fitting that Southern California was chosen for the program, since this region was hit especially hard by defense cutbacks. The program is planned to last two years and produce 60 new teachers.

If it is successful, it should be continued beyond the initial phase. Students will get good teachers, and those with new careers will have rewarding jobs that provide a feeling of accomplishment.

LOS ANGELES PUBLIC SCHOOLS

Turning Engineers into High School Teachers

With a $5 million Department of Defense grant for five years, the National Research Council and the Los Angeles Unified School District have created the Defense Reinvestment Initiative (DRI). The program retrains engineers and scientists affected by the downsizing and restructuring of Southern California aerospace and defense industries to work as middle and high school math and science teachers in Los Angeles's inner-city public schools.

DRI focuses on inner-city classrooms because "that's where the greatest need for qualified math and science teachers is," says director Maureen Shiflett. "If you can get people comfortable with that atmosphere by training there, they are more likely to stay teaching there."

The first participants began the program last summer and hope to enter their own classrooms in the L.A. public schools in the fall of 1996. The 15 professionals, culled from 65 applicants, were chosen on the basis of academic background, experience with children, letters of recommendation, and interviews, and include electrical, mechanical, chemical, and aerospace engineers.

The curriculum, designed by William Ritz, chair of the department of science at Cal State University, Long Beach, focuses on sensitivity training, current reforms in education, and ways to help children become better thinkers.

Also important, stresses Ritz, is a healthy dollop of hands-on participation by the teachers-in-training. These objectives are integrated into a program in which experienced secondary school teachers are encouraged to rethink their own presentations while teaching the program's "fellows."

With an eye toward the unique frustrations of an older group embarking on a second career, DRI hopes to establish a two-year follow-up support system in which participants will receive continued support and feedback through a series of workshops and conferences.

Participants appreciate the backing DRI provides in their career change. Diego Zamora, 34, worked as an electrical engineer for Hughes Aircraft for 13 years. When he read about the initiative to begin DRI, he knew he had to apply. "In college, it was between being a teacher and being an engineer," Zamora recounts, "and when I checked the starting salaries of both I said: 'Well, I guess it's going to be engineering.'" But, in later years and with an industry downturn, Zamora lost satisfaction with his job. He will teach high school science and, though he had to get over the money barrier, waxes enthusiastic about the school he's been training in. It's "in a very poor area—it's got gangs and graffiti—but the high school itself is an oasis," he says. Zamora believes he will remain a teacher and not look back. "The bottom line is I wasn't happy. You can't put a price on happiness."

For more information, contact Maureen Shiflett, (714) 721-2232.

—RACHEL A. SCHWARTZ

DRI fellows Diego Zamora (top) and Peter Goudeaux (bottom), working with Bell High School students.

PHOTOS BY SUSAN DECKBAR(2)

Scientists, mathematicians and engineers leaving careers in the military, defense or aerospace industries, and national laboratories, represent a large pool of talent for teaching.

These talented individuals bring a unique perspective to the classroom through their experiences in working cooperatively in industry and their ability to provide realistic experiences and applications to the students.

IMPORTANT DATES

By *February 15, 1995:* Applications will be mailed to potential candidates.

March 30, 1995: All applications are due.

April 10, 1995: Interviews will begin.

May 15, 1995: "Teaching fellow" candidates are notified of acceptance.

July, 1995: Classes begin at Cal State, Long Beach.

September, 1996: New teachers begin full-time teaching assignments.

For more information, contact:

Maureen Shillett, Director
Defense Reinvestment Initiative
National Research Council
100 Academy Drive
Irvine, CA 92715
Ph: (714) 721-2232
FAX: (714) 721-2277
E-mail: mshillet@nas.edu

MAKE A DIFFERENCE... TEACH

DEFENSE REINVESTMENT INITIATIVE

NATIONAL RESEARCH COUNCIL

NRC NAS NAE IOM

DEFENSE REINVESTMENT INITIATIVE: MAKE A DIFFERENCE THROUGH TEACHING

A Project of the National Research Council

You qualify for the Defense Reinvestment Initiative if you

- are currently, or have recently been, a member of the military or a civilian employee of the military

or

- work for, or have recently worked for, a defense-related or aerospace industry

or

- work for, or have recently worked for, a national laboratory

and

- have at least a bachelor's degree in mathematics, science, or a field of engineering

and

- are enthusiastic about working with young people.

The site of the pilot program is the Los Angeles Unified School District (LAUSD) with emphasis on urban schools. LAUSD is the second largest school district in the nation, with one of the most diverse student populations.

Courses and field experience with master teachers in the LAUSD will be offered and supervised through California State University, Long Beach (CSULB). Much of the course work will be offered at school sites in LAUSD to minimize driving time for the teaching fellows and master teachers.

Through example and content, the program will prepare teachers who will be able to teach in the ways called for by the National Standards in Mathematics Education and the emerging National Standards in Science Education.

Science and mathematics education is changing for the better! You can be a leader in that process of change and help prepare young people to be successful in an increasingly technological society.

◇

The first cadre of teaching fellows will begin in summer, 1995 and will be prepared to begin full-time teaching by the fall of 1996. Each teaching fellow will receive a $22,000 stipend to help defray the cost of the full-time one-year preparation period. An extensive two-year program of follow-up support with opportunities for professional growth and leadership development will be provided to the newly credentialed teachers.

◇

APPENDIX G

Haberman Interview

A BRIEF HISTORY

of

The Urban Teacher Selection Interview

Our Mission:
To improve the chances of school change occurring through time-tested personnel hiring and selection practices.

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A BRIEF REVIEW OF THE HISTORY AND DEVELOPMENT OF THE *URBAN TEACHER SELECTION INTERVIEW*

By Martin Haberman
University of Wisconsin, Milwaukee (February, 1991)

Between 1958 and 1961 as part of my work supervising student teachers in a fifth year, masters level program offered by Teachers College, Columbia in the Harlem schools of New York City, I reached the following conclusions:

1. Teacher education is not a generic process. The preparation of teachers for urban, multicultural schools is a distinctive enterprise.

2. Mature college graduates who are adults with work and life experiences are more likely to be successful in urban schools than traditional students in undergraduate programs.

3. Selection is significantly more important than training. It is easier and wiser to select people with attributes that will enable them to succeed in metropolitan schools than it is to expect that individuals who might be sexist, racist, uncreative, uninterested in the world of ideas, rigid, moralistic, humorless, or fearful will be transformed by virtue of completing a traditional teacher education program.

4. Urban teacher preparation actually occurs in schools, with children, while functioning in the role of teacher with the help of a coach or mentor and not as an undergraduate in a generic teacher education program.

5. Since exceedingly few college faculty have ever taught in urban, multicultural schools, the best teacher educators are practicing classroom teachers who are effective with urban children and youth.

During this period I thoroughly reviewed the literature related to the MMPI (Minnesota Multiphasic Personality Inventory) as well as other personality tests. Two of my mentors at the time were Irving Lorge and Robert Thorndike who helped me see that written tests of personality could not predict who would be an effective teacher and that it was conceptually not reasonable to expect personality dimensions to remain constant across different school situations. Previously, A. S. Barr and his doctoral students at the University of Wisconsin Madison in the 1930s and 1940s had also attempted to identify universal teacher attributes that would predict success but they could not, except in general terms.

relate teacher traits to pupil outcomes. By 1960 David G. Ryans of the University of Texas had captured the imagination of teacher educators with his exhaustive analysis of what makes a good teacher. Ryans' conclusions were stated as personal characteristics such as humor, enthusiasm, creativity, etc. which not only reflected personality dimensions but also attributes which began to relate to the work of the teacher. But the issue remained: Are these teacher characteristics which can be reasonably taught to large numbers of undergraduates in teacher education programs, or is it more reasonable to select and prepare individuals already predisposed to manifest these characteristics?

At this same time Robert K. Merton presented a sociological analysis of professions in which he put forward the concept of mid-range functions. In *Figure 1*, I have applied this concept to the task of predicting teacher success. At one extreme (left) are psychological approaches which purport to identify personality traits that individuals can be expected to demonstrate regardless of the situations in which they are placed. At the other extreme (right) are the situational demands of teaching as it is practiced in a specific school or institution. Merton argued that both extremes were dysfunctional. It is not possible to generalize from personality dimensions to how individuals will behave across the range of school situations they may encounter. We all know "shy," "aggressive," and other types of teachers who might be successful in some schools but not others. At the other extreme, it is also useless to attempt to specify the precise behaviors required of effective teachers in a given situation. The numbers of such behaviors become too large for purposes of either teacher training or evaluation. For example, the State of Wisconsin has officially recognized 227 effective teacher behaviors and many more might be generated if specific situations were fully examined.

To negotiate between these extremes Merton advocated that each profession develop mid-range functions, that is, clusters, chunks, or groups of behaviors that particular practitioners must demonstrate in order to be effective. These are relatively small in number and while they manifest an individual's personality, they are sufficiently behavioral so that observers can identify what effective teachers do.

Figure 1 **BASES FOR PREDICTING TEACHER SUCCESS**

Personality Traits		Situational Demands
(What are effective, constant teacher characteristics?)	Mid Range Functions	(What behaviors would be effective for all teachers in a given situation?

Identifying the Mid-Range Functions

Observing 124 student teachers over a three year period in New York City schools (1958-1961) enabled me to identify 18 "Stars" and 14 "Failures." "Stars" were those individuals defined by all supervisors and cooperating teachers as equal to or better in performance than satisfactory, experienced teachers after only *the first few weeks of their teaching*. "Failures" were those who all others (cooperating principals, teachers, and college supervisors) agreed should not be teaching and who screened themselves out of teaching. By comparing these extremes, eight mid-range functions were identified: organizational skills, stamina, creativity, human relations, planning, discipline, teaming, and self analysis. Comparing the performance of these functions seemed to account for the difference between "Stars" and "Failures."

In 1962 I began to further refine the process of identifying mid-range teacher functions and trying to translate them into questions that might be used in selection interviews. If we could identify potential success in urban teaching by using an interview, much time and effort might be saved and much inconvenience might be avoided. Individuals with high potential for urban teaching and with satisfactory undergraduate GPAs might be screened into teacher education while many others, also with satisfactory GPAs, might be screened out. Most of all, children and youth would not have their time wasted. In the traditional situation of utilizing inappropriate selection criteria, children and youth are, in effect, used as the screening mechanism. Once an individual has an appropriate skills level (approximately 8th grade reading and math levels are required in most states) and a satisfactory GPA in university study, there is no further screening until s/he actually fails with children and youth. Fifty percent of beginning teachers fail or quit in their first 3-5 years of urban teaching. As a result of this non-system of selection, it is children and youth who serve as the actual selection process. Because GPA, skills tests, grades in student teaching, and personal references are the typical selection criteria currently in use and because these criteria do not predict effectiveness in urban schools, we have a revolving door for teachers in urban districts. Children and youth most in need of greater stability in their lives are most likely to experience the most teacher turnover.

The first selection interviews were conducted in Milwaukee in 1962. I had been asked to develop a fifth year intern program for liberal arts graduates to become teachers in the Milwaukee Public Schools. The model we developed became the National Teacher Corps in 1965. In these 3 years (1962-1965) 108 interns were admitted and followed through their first year of teacher practice. In this period we refined interview questions to more accurately reflect mid-range functions that distinguished between outstanding teachers and failures. We evaluated the interview instrument by checking our initial predictions against how interns actually performed in their subsequent teaching. In this three year period the interview was a research tool for evaluating predictions and not actually used to screen people in or out of the program. The 108 admitted (on traditional criteria) were then ranked by two interviewers in terms of how well they did on our interview. The following scheme was used to categorize our predictions.

Figure 2

Star	
High	High Low
Average	High Low
Failure	

The comparison of "before" assessments based on our interview against "after" evaluations based on actual teaching performance can be seen in *Figure 3.*

Figure 3 **COMPARISON OF ORIGINAL INTERN INTERVIEWS WITH ACTUAL PERFORMANCE**

CATEGORY	INTERVIEWS	PERFORMANCE
Stars	17	19
High	43	51
Average	36	25
Failures	12	13
Total	108	108

Our operational definition of an error was the following:

1. Assessing any individual as any category other than Failure who subsequently fails.

2. Assessing any individual as a Failure who subsequently achieves any higher level in practice.

3. Misplacing a candidate by more than one category. This means that a person assessed as a Star who proved to be High would not be considered an error unless he proved to be Average and vice versa.

Defining these misassignments as mistakes, we made 3 errors on the first 108 candidates interviewed.

"Performance" was operationally defined as the sum of the evaluations of those who had actually observed and supervised the interns: the cooperating teachers, principals, and college supervisors. The self evaluations of interns were also considered.

Beginning in 1966 the Urban Teacher Selection Interview was used to select college graduates for the Milwaukee Intern Teaching Program. At the time of the program's termination in 1973 approximately 1,500 interns had completed the interview and the program.

Interviews were always conducted by two professionals: one faculty member representing the School of Education of UW-Milwaukee and one representative of the Milwaukee Public Schools, usually a central office supervisor. During this period several classroom teachers who served as cooperating teachers were also trained to conduct the interview and to serve on the two-person interview teams.

In the eleven years the program was operational there were five different Directors who utilized different pairs of individuals to conduct these selection interviews. *In every year Directors reported less than a 3 percent error between prediction and performance. As training of interviewers has become systematic, this error has dropped to approximately 1 percent.*

The Chicago Trials

In 1966, the Great Cities Research Council was comprised of fifteen great cities each represented by its Superintendent of Schools and the Dean of the School of Education of a major teacher preparation institution in each of the cities. Superintendents frequently invited their deputies to represent them at these meetings and Deans were sometimes represented by a designated faculty member. At that time, Milwaukee was the thirteenth largest school system and I attended these meetings as a representative of the UWM School of Education. Evelyn Carlson was the Associate Superintendent of the Chicago Public Schools and was also a frequent attendee. As is common during many periods, the Chicago Public Schools was short of regularly prepared, certified teachers. In 1966, approximately 1,000 college graduates without teacher preparation were hired and appointed on probationary licenses. With the help of Ms. Carlson, I followed-up this population. In May of 1967 there were only 167 of these individuals still teaching. We interviewed this population and discovered that they had not all survived their first year on the job (with no special help or supervision) because they were particularly effective. Indeed, most of them were "strong, insensitives." Comparing our interview against the ratings of supervisors, we found less than a 5 percent error.

Figure 4 **PREDICTING THE SUCCESS OF CHICAGO FIRST-YEAR TEACHERS WITHOUT TEACHER PREPARATION (1967)**

CATEGORY	INTERVIEWS	EFFECTIVENESS RATINGS
Stars	16	19
High	49	88
Average	74	40
Failures	28	20
Total	167	167

Modification in Questions

At this point it would be useful to review the nature of the interview questions and how they were transformed and refined as a result of the numerous trials. First, it must be recognized that two of the most critical Mid-Range Functions have never been utilized in the interview because we have never been able to develop questions which adequately assess or predict their manifestation in subsequent practices: these are, *organizational skills* and *stamina*.

Organizational skills refer to the myriad of ways in which Stars systematize their classrooms and the rules they set up to govern pupils living together on a daily basis. These organizational skills refer to how materials are stored and used, how equipment is used and cared for, seating arrangements, the allocation of time, procedures for passing in work, pupil movement within and outside of classrooms and the numerous other procedures which successful teachers organize effectively and which unsuccessful teachers find to be a continuing source of problems and disruptions.

Stamina refers to both the physical energy required of those who teach all day, every day *and* the emotional strength required to withstand the unending shocks to the psyche and emotions as one deals with pupils of boundless energy who are frequently hungry, without adequate medical or dental attention and frequently uncared for or mistreated. For educators to strive to do their best and not succumb to helpless pity or be overwhelmed by their pupils' unmet needs requires much physical strength and strength of character.

In over thirty years of comparing Stars and Failures, two truths have remained constant. First, there are no Mid-Range Functions more critical to the success of an urban teacher than organizational skills and emotional/physical strength. Second, there are no ways we have ever devised which will enable us to interview individuals and predict their

organizational skills and stamina. These functions seem to be beyond our ability to create interview questions. Fortunately, there are seven other Mid-Range Functions for which interview questions have been developed and refined and which do predict subsequent success in urban teaching. Following is a brief review of how the original Mid-Range Functions were clarified and refined as a consequence of the iterative process:

Creativity was originally used to describe the first Mid-Range Function. We soon realized that successful teachers demonstrated more than alternative-seeking behavior. They were manifesting problem solving skills; the ability to define and evaluate as well as the ability to generate options. After a few years we realized that we were also seeing teachers demonstrate these functions with tenacity and commitment. In recent years we have used the term "Persistence" to denote *both* the creative and problem solving functions and to emphasize that the work of the teacher requires their continuous application. As used in our interview, therefore, "Persistence" refers to the total process of continually seeking solutions to never-ending problems.

The second Mid-Range Function was originally identified as human relations skills and referred to the effective teacher's ability to get along with other adults, colleagues, and administrators in the school setting. Through subsequent trials this skill was refined further since substantial numbers of Failures were sometimes liked by other adults. The critical dimension here is not popularity or "getting along" but how effective teachers protect their pupils' right to learn in situations which may be contrary to school rules or norms. This Mid-Range Function is particularly relevant in urban schools which are highly bureaucratic and overly organized. To better pinpoint the function the term became clarified as "Response to Authority" and refers to the effective teacher's willingness to support student learning in the face of or even against school policy.

The third Mid-Range Function refers to the effective teacher's ability to apply generalizations about teaching, learning, and development of his/her particular classroom. Originally, this function was termed "planning" but by the iterative process of trial and retrial it soon became clear that what was meant was beyond traditional notions of teacher planning. Successful teachers were consistently distinguishable from failures by their ability to apply principles to practice, *or* to generalize from their practice about the principles they were demonstrating.

The fourth Mid-Range Function evolved into two parts. Originally labeled discipline, it soon became evident that what was meant was the effective teacher's ability to not blame the victim and accept accountability for teaching all children. At the same time effective urban teachers realize they cannot love every pupil but are still responsible for teaching even the less lovable and especially the unlovable.

The fifth function was originally termed "teaming", then "bureaucracy", and finally, "burnout." This evolution refers to the continuing distinction between Stars and Failures to explain and act on their perception of the causes and cures of low teacher morale.

The final function was originally termed self-analysis. This has evolved into fallibility to more adequately account for both the ability to study one's behavior and motives *and* to recognize and accept oneself and others as human beings.

In sum, the actual Mid-Range Functions have *not* changed. The original distinctions between Stars and Failures have remained constant. What has been refined through the numerous trials and validations of the interview over the years have been the *terms* used to identify the Mid-Range Functions and the *questions* used in the interview to get at these functions. *Figure 5* summarizes the original and current terms used to denote the seven components of the interview. The interview document itself and its accompanying procedures of administration further clarify this development.

For a more complete explanation of the Mid-Range Functions, see "Interview Questions to Accompany the Urban Teacher Selection Interview Continua" and the "Urban Teacher Selection Interview" itself.

Figure 5 **ORIGINAL AND CURRENT TERMS FOR IDENTIFYING MID-RANGE FUNCTIONS**

	ORIGINAL		CURRENT
I.	Creativity, Problem Solving	I.	Persistence
II.	Human Relations Skills	II.	Response to Authority
III.	Planning	III.	Application of Generalizations
IV.	Discipline	IV.	Approach to At-Risk Students
		V.	Personal/Professional Orientation
V.	Teaming	VI.	Burnout
VI.	Self-analysis	VII.	Fallibility

Scoring

The interview is not scored by assigning points. Each interviewer places an X on each of the seven continua. At the completion of no more than three interviews both interviewers discuss and agree upon a ranking of the three candidates. The candidates are not only ranked but also assigned a category (Star, High, Average, Failure, as in *Figure 1*). Each subsequent set of three interviews requires the interviewers to fit the additional 3 candidates into the total rank order and to place each candidate in a category. Both the ranking and categorization of candidates is done by discussion and mutual agreement

between the two interviewers. If the interviewers agree that a candidate goes off the extreme left on *any* continuum on *any one* of the seven functions, the candidate is considered to have failed. The seven functions are divided into two subparts yielding a total of 14 continua. Each candidate must, therefore, avoid being rated on the extreme left end of any continuum on all fourteen subparts. Again, the basis of this procedure is the teaching behavior of successful Stars as that behavior is distinguishable from Failures. It is easy (and appealing) for readers to simply "feel" or "believe" that they agree or disagree with these functions and overlook the basis of their derivation.

More Recent Developments

Urban school districts, particularly those in states with alternative certification, have used the interview to help select college graduates without teacher training as beginning teachers. This is the population and purpose for which the interview was developed and its most appropriate use. In some cities candidates selected as teachers also have coaches or mentors to help them and in some places there is also supporting coursework. In many cities both on-site coaches and some classes are offered to beginners. So long as the individual being interviewed is a college graduate and the teaching position subsequently performed is in an urban school, the interview is being used with the population and for the purpose it was developed.

Teacher educators in "regular" university teacher education programs have long requested me to apply this instrument to the prediction of success in student teaching in urban schools with undergraduates. I resisted this pressure for many years because student teaching seems to me to be an inadequate criterion of effectiveness. It is possible for a poor, even inadequate student teacher to appear better than s/he really is because the classroom is actually set up and managed by someone else–a cooperating teacher. It is, in effect, not a fair test of the student teacher and, therefore, an inadequate criterion for judging the interview's ability to predict success. A second reason for my reluctance is the relative ease of the student teaching experience when compared to the extraordinary pressure on a beginning urban teacher without any teacher training. If I have an instrument which predicts who can swim across Lake Michigan, I would not consider it a fair test of the instrument to use it to predict who can swim two laps of an indoor, heated pool. Major differences in degree create a new order of activity. Swimming is not swimming. Teaching is not teaching.

I first attempted to try the instrument "against" subsequent success in student teaching in Fall 1985 with a group taught by Jack Stillman in the School of Education, UWM. At this point I began using Dr. Linda Post as my interviewing partner. We interviewed, categorized, and ranked 14 of them. Professor Stillman's personal judgment of how well the student teachers achieved was the criterion of "success." He ranked and categorized his students at the end of their student teaching. The results were as follows: we concurred on the single Failure; and disagreed on the number of Stars (2 versus 4). Our rankings were essentially

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identical with his categorization being somewhat higher; that is Stars, including Rank 4 and Highs, extended several ranks deeper into the list. Given the ways errors in categorization are calculated, this trial was 100% accurate. (See *Figure 3*). I then undertook several subsequent trials with undergraduates in regular programs against the criterion of college supervisors' ratings of success in student teaching.

We also conducted two trials with student teachers in Exceptional Education. One group had 22 and a second 26. With the exception of one disagreement by interviewers, there was 100 percent prediction against the final evaluations of student teacher supervisors.

Continuing with Dr. Linda Post as my interviewing partner, we began a summer program in human relations training for undergraduates in University of Wisconsin System institutions. These students were required to take classes but, more importantly, to work in the summer schools of the Milwaukee Public Schools for six weeks. These were all undergraduates, mostly sophomores, having their first direct experiences as well as their first urban, multicultural experiences.

The criterion of success was the judgment of college supervisors regarding students' interactions with children during this six week period. In Summer 1989, we ran a trial of 22 students. In 1990, we interviewed sixteen. In both cases there were minor differences between our initial ratings and subsequent practice. These differences merely refer to how deep into the rank order a particular category (i.e., Star, High, Average) went into the list. In effect, the supervisors' ratings were somewhat higher than the initial interviewers'. In both years there was again 100% predictability between the initial interview and subsequent practice. This means, as errors in categorization are calculated, there were no Failures overlooked and no individuals whose categorization was miscalculated by more than one category.

Sporadically, since 1985 there have been individual and a small groups of student teachers (up to five) who we have interviewed and compared against their subsequent student teaching success.

These trials with student teachers are of little interest to me. As noted earlier, the fact that we have been totally accurate in predicting their "success" has in no way convinced me that student teaching is a worthwhile criterion to use since the large number of student teachers who are judged to be "A" and who subsequently fail in urban schools is too large to ignore. The almost total dependence on the cooperating teacher makes this experience a flawed model of preparation for urban teaching.

Costs and Training

Unlike instruments thought to be comparable, there is *no* per-interview cost to the school district or institution that chooses to use this interview. Consultant companies

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currently charge as much as $3,000 for a total processing of each candidate for a position.

The only costs involved in using this interview is the training of the interview pairs. This requires 1 day in which the trainees are trained to question and score candidates on each of the mid-range continua. The trainees learn and practice with carefully developed videotapes and coached by authorized trainers in the precise way of asking the questions. Meeting proficiency at the conclusion of the training enables all certified interviewers *to have unlimited use of the interview with no additional cost.* All persons, wanting to use the interview correctly, must become certified interviewers by successfully completing the authorized training session. Follow-up and up-date training sessions are scheduled and announced as needed.

Latest Developments

Several urban school districts are currently involved in using the interview with adult college graduates hired as teachers in states with alternative certification. These trials are ongoing and provide continuous feedback regarding questioning techniques and interviewer training.

I work closely and personally with the Urban Teacher Education Program in the school districts of Gary, East Chicago, and Hammond, Indiana. In these districts the interview is being tried with college graduates in an experimental certification program. These trials will also yield valuable data.

At the University of Wisconsin-Milwaukee we currently have a trial group of 21 college graduates who are all minorities. When these individuals begin teaching we will have another valuable data set.

In sum, the interview has evolved for over thirty-two years spanning four decades of change in urban schools in cities across the United States.

The precise wording of questions used in the interview continue to be refined. The actual Mid-Range Functions performed by successful urban teachers remain constant.

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TRAINING WORSKSHOP FOR THE HABERMAN
URBAN TEACHER SELECTION INTERVIEW

AGENDA

8:00am	Sign In, Coffee, Reading of *A Brief Review of the History and Development of the Urban Teacher Selection Interview*
8:15am	Opening Remarks, Ice Breaker, Signing of Professional Agreement, Distribution of Training Manual
9:00am	Discussion of *A Brief Review of the History and Development of the Urban Teacher Selection Interview*
9:30am	Mid-Range Function I: Persistence
9:50am	Mid-Range Function II: Response to Authority
10:10am	Break
10:20am	Mid-Range Function III: Application of Generalizations
10:40am	Mid-Range Function IV: Approach to At-Risk Students
11:00am	Mid-Range Function V: Personal/Professional Orientation
11:20pm	Mid-Range Function VI: Burnout
11:40pm	Mid-Range Function VII: Fallibility, Review of all 7 Functions, Small Group Interviewing Assignment
12:00pm	Lunch
1:00pm	Small Group Interviewing
2:00pm	Guided Practice Interview, Debriefing of Guided Practice
2:45pm	Break
3:00pm	Proficiency Test #1, Evaluation
3:45pm	Proficiency Test #2 (if needed)
4:15pm	Reflections

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BIOGRAPHY OF MARTIN HABERMAN

Dr. Martin Haberman is a teacher educator who has been directly or indirectly involved in shaping every major development in American teacher education over the past thirty years. These include developing:

- Some of the original MAT programs for liberal arts graduates;
- The NCATE standards for accrediting schools and colleges of Education;
- The training of teacher trainers (TTT) program;
- Professional Development Centers planned and operated by teachers;
- Various forms of alternative teacher certification programs; and
- Specific programs for recruiting and preparing more blacks and Hispanics.

Martin Haberman grew up in New York City. His formal education includes bachelors and masters degrees in sociology from Brooklyn College and New York University. These were followed with a second masters and a doctorate in Education from Teachers College Columbia University. It is clear that his advisor, Florence B. Stratemeyer, helped shape his commitment to educating a free people.

In addition to an extremely long list of publications (7 books, 38 chapters, 120 articles) and numerous research studies, Haberman has engaged in some divergent contributions. These include his extensive use of media–particularly radio–in reaching teachers, six years as the Editor of the *Journal of Teacher Education*, and eleven years as a dean in the University of Wisconsin trying to apply the successes of extension in rural America to the problems of life in urban areas.

Professor Haberman has served on eight editorial boards. He holds several awards for his writing, a Standard Oil Award for Excellence in Teaching, a special award from The Corporation for Public Broadcasting and AACTE Medals for offering a Hunt Lecture and the Pomeroy Award (1990). In January, 1989 Rhode Island College awarded him an honorary doctorate. He is a distinguished member of the Association of Teacher Education and a Laureate member of Kappa Delta Pi. The most widely known of his developments was The National Teacher Corps, which was based on his intern program in Milwaukee and which brought hundreds of thousands of college graduates into urban schools all over America. Currently, his developmental efforts are focused on helping to resolve the crises in urban schools serving twelve million at-risk students. By working directly with teacher unions, school districts and university researchers, he is demonstrating new forms of teacher preparation based on practice and coaching rather than on traditional university coursework. If successful, these research-demonstrations will radically alter the nature of teacher education and certification in America.

Professor Haberman's work represents a continuous effort to make the preparation of teachers not only more effective, but also more relevant to schools in a multicultural society. In effect, his career has been an effort to transform teacher education into an instrumentality with redeeming social significance.